

STATE OF NEW HAMPSHIRE

INTER-DEPARTMENT COMMUNICATION

		DATE:	June 15, 2020
FROM:	Andrew O'Sullivan Wetlands Program Manager	AT (OFFICE):	Department of Transportation
SUBJECT	Dredge & Fill Application Statewide (Woodstock), 41915		Bureau of Environment
TO	Karl Benedict, Public Works Permitting Officer New Hampshire Wetlands Bureau 29 Hazen Drive, P.O. Box 95 Concord, NH 03302-0095		

Forwarded herewith is the application package prepared by NH DOT Bureau of Bridge Design for the subject major impact project. This project is classified as major per Env-Wt 514.07(c)(2); bank/shoreline stabilization that is greater than 200 LF in length cumulatively. The project is located along Interstate 93 in the Town of Woodstock, NH. The proposed work consists of riprap bank stabilization and channel scour protection at the outlet of Bridge 203/079 that carries Eastman Brook under the interstate. The project proposes to use A-Jacks as the channel scour protection measure. The A-Jacks will be placed to match the bridge's outlet invert, eliminating the perched outlet condition.

This project was reviewed at the Natural Resource Agency Coordination Meeting on April 15, 2020. A copy of the minutes has been included with this application package. A copy of this application and plans can be accessed on the Departments website via the following link:

<http://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/wetland-applications.htm>. The project team also met with NHDES, Karl Benedict and Lori Sommer, via a virtual meeting to discuss mitigation on June 18, 2020. The minutes from this meeting are included within the permit application.

NHDOT anticipates that this project will be reviewed and permitted by the Army Corp of Engineers through the State Programmatic General Permit process. A copy of the application has been sent to the Army Corp of Engineers.

Mitigation is not required for the proposed work. A detailed mitigation narrative is included within the permit application.

The lead people to contact for this project are David Scott, Bureau of Bridge Design (271-2731 or David.Scott@dot.nh.gov) or Sarah Large, Wetlands Program Analyst, Bureau of Environment (271-3226 or Sarah.Large@dot.nh.gov).

A payment voucher has been processed for this application (Voucher # 615104) in the amount of \$3,457.60.

If and when this application meets with the approval of the Bureau, please send the permit directly to Andrew O'Sullivan, Wetlands Program Manager, and Sarah Large, Wetlands Program Analyst, Bureau of Environment.

AMO:sel
Enclosures

cc:
BOE Original
Town of Woodstock (4 copies via certified mail)
David Trubey, NH Division of Historic Resources (Cultural Review Within)
Bureau of Construction (via electronic notification)
Carol Henderson, NH Fish & Game (via electronic notification)
Maria Tur, US Fish & Wildlife (via electronic notification)
Beth Alafat, US Environmental Protection Agency (via electronic notification)
Jeanie Brochi, US Environmental Protection Agency (via electronic notification)
Michael Hicks, US Army Corp of Engineers (via electronic notification)
Richard Kristoff, US Army Corp of Engineers (via electronic notification)
Kevin Nyhan, BOE (via electronic notification)

S:\Environment\PROJECTS\STATEWIDE\41915\Wetlands\Woodstock\WETAPP - Highway.doc

**Bridge 203/079 – Interstate 93 over Eastman Brook
Woodstock, NH**

**NH Department of Transportation (NHDOT)
Statewide Bridge Scour Stabilization Project
Federal Project Number: X-A004(779)
NHDOT Project Number: 41915**

**New Hampshire Department of
Environmental Services**

Wetlands Bureau Permit Application

Hoyle, Tanner Project Numbers: 092592.01 & 092590.18



July 2020

Prepared By:
Hoyle, Tanner
& Associates, Inc.
150 Dow Street
Manchester, New Hampshire 03101
603-669-5555
603-669-4168 fax
www.hoyletanner.com

July 10, 2020

D.E.S. Wetlands Bureau
P.O. Box 95
Concord, NH 03302-0095



Re: Wetlands Permit Application
NHDOT Statewide Scour Stabilization No. 41915
Bridge 203/079 – Interstate 93 over Eastman Brook
Woodstock, NH
Hoyle, Tanner Project Nos. 092592.01 & 092590.18

Dear Sir/Madam:

The NH Department of Transportation (NHDOT) Statewide #41915 Project involves stabilization efforts at seven locations to address scour issues and prevent additional scouring or undermining of the existing crossing, and, where feasible, increase aquatic organism passage through the crossing.

I-93 over Eastman Brook is located in Woodstock, NH. The existing 42-foot span structure is a twin cell concrete box culvert (18' clear span each barrel) that originally included riprap at the culvert at the inlet and outlet. This riprap has washed away at the downstream outlet, and significant bank erosion has occurred where the Eastman Brook's bend has been propagating toward a private landowner's property. Proposed stabilization measures would include installation of A Jacks or an armor matrix component system on the outlet side within the streambed and Class IX riprap to be placed on the banks for a distance of approximately 87 feet. There is steel sheeting in the river on the downstream side that will be cutoff at the armor matrix bottom elevation as needed for installation.

There will be permanent and temporary resource impacts as a result of the project. All areas of temporary disturbance will be re-vegetated upon work completion. A filing fee of \$3,457.60 is included with the package. The current schedule is to commence construction in the spring of 2021 and complete construction by fall 2021.

If you require any additional information, please feel free to contact me at your convenience.

Very truly yours,
HOYLE, TANNER & ASSOCIATES, INC.

A handwritten signature in black ink, reading "Kimberly R. Peace".

Kimberly R. Peace
Senior Environmental Coordinator

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**STANDARD DREDGE AND FILL
WETLANDS PERMIT APPLICATION**
Water Division/Land Resources Management
Wetlands Bureau
[Check the Status of your Application](#)



RSA/Rule: RSA 482-A/Env-Wt 100-900

APPLICANT'S NAME: NH Dept. of Transportation

TOWN NAME: Woodstock

Administrative Use Only	Administrative Use Only	Administrative Use Only	File No.:
			Check No.:
			Amount:
			Initials:

A person may request a waiver to requirements in Rules Env-Wt 100-900 to accommodate situations where strict adherence to the requirements would not be in the best interests of the public or the environment. A person may also request a waiver of standard for existing dwellings over water pursuant to RSA 482-A:26, III (b). For more information, please consult the [request form](#).

Section 1 - Required Planning for all projects (Env-Wt 306.05; RSA 482-A:3, I(d)(2))

Please use the [Wetland Permit Planning Tool \(WPPT\)](#), the Natural Heritage Bureau (NHB) [DataCheck Tool](#), the Aquatic Resource Mapper, or other sources to assist in identifying key features such as: [priority resource areas \(PRAs\)](#), [protected species or habitats](#), coastal areas, designated rivers, or designated prime wetlands.

Has the required planning been completed? ☒ Yes ☐ No

Does the property contain a PRA? ☐ Yes ☒ No. If yes, provide the following information:

- Does the project qualify for an Impact Classification Adjustment or a Project-Type Exception (See Env-Wt 407.02 and Env-Wt 407.04)? ☐ Yes ☐ No
- Protected species or habitat? ☐ Yes ☐ No. If yes, species or habitat name(s):
- NHB Project ID #: NHB20-1199
- Bog? ☐ Yes ☐ No
- Floodplain wetland contiguous to a tier 3 or higher watercourse? ☐ Yes ☐ No
- Designated Prime Wetland or duly established 100-foot buffer? ☐ Yes ☐ No
- Sand dune, tidal wetland, tidal water, or undeveloped tidal buffer zone? ☐ Yes ☐ No

Is the property within a Designated River corridor? ☐ Yes ☒ No. If yes, provide the following information:

- Name of Local River Management Advisory Committee (LAC):
- A copy of the application was sent to the LAC on Month: Day: Year:

For stream crossing projects, provide watershed size: N/A

For dredging projects, is the subject property contaminated? ☐ Yes ☒ No
If yes, list contaminant:

Is there potential to impact impaired waters, class A waters, or outstanding resource waters? ☐ Yes ☒ No

Section 2 - PROJECT DESCRIPTION (Env-Wt 311.04(i))

Provide a brief description of the project and the purpose of the project, outlining the scope of work to be performed and whether impacts are temporary or permanent. DO NOT reply "See attached" in the space provided below.

The NH Department of Transportation (NHDOT) is proposing streambank and streambed stabilization measures at the Interstate 93 crossing over Eastman Brook in Woodstock, NH to address existing scour issues, to prevent future scouring or undermining of the crossing, and, where feasible, to improve aquatic organism passage through the crossing.

The existing 42-foot span structure is a twin cell concrete box culvert (18' clear span each barrel) that originally included riprap at the culvert at the inlet and outlet. This riprap has washed away at the downstream outlet, and significant bank erosion has occurred where the Eastman Brook's bend has been propagating toward a private landowner's property. Proposed stabilization measures would include installation of A Jacks, also called an armor matrix component system, at the outlet within the streambed and place Class IX riprap on the banks for bank stabilization and scour protection against the high flows through this crossing. There is steel sheeting in the river on the downstream side that will be cutoff at the armor matrix bottom elevation as needed for installation.

The proposed project would result in a total of 4,039 square feet and 116 linear feet of temporary wetland impact and 4,605 square feet and 157 linear feet of permanent wetland impact. Temporary impacts are associated with space for the installation of water diversion structures, a clean water bypass system, and other erosion control best management practices as well as vegetation clearing at the southern extent of a construction access road from the north to the outlet of the crossing. Permanent impacts are associated with the replacement of riprap along both banks downstream of the crossing and installation of A Jacks within the stream channel at the outlet of the crossing.

SECTION 3 - PROJECT LOCATION

Separate wetland permit applications must be submitted for each municipality within which wetland impacts occur.

ADDRESS: Interstate 93 over Eastman Brook

TOWN/CITY: Woodstock

TAX MAP/BLOCK/LOT/UNIT: Map 124 Lots 5,8,12; Map 125 Lot 15

US GEOLOGICAL SURVEY (USGS) TOPO MAP WATERBODY NAME: Eastman Brook

☐ N/A

(Optional) LATITUDE/LONGITUDE in decimal degrees 43.80729° North

(to five decimal places):

-72.16308° West

SECTION 4 - APPLICANT (DESIRED PERMIT HOLDER) INFORMATION (Env-Wt 311.04(a))

If the applicant is a trust or a company, then complete with the trust or company information.

NAME: NH Department of Transportation – David Scott, PE, and Andrew O’Sullivan, Wetlands Program Manager

MAILING ADDRESS: P.O. Box 483, 7 Haven Drive

TOWN/CITY: Concord

STATE: NH

ZIP CODE: 03302

EMAIL ADDRESS: david.scott@dot.nh.gov ; andrew.o'sullivan@dot.nh.gov

FAX: (603) 271-2759

PHONE: (603) 271-2731

ELECTRONIC COMMUNICATION: By initialing here: DS & AMO, I hereby authorize NHDES to communicate all matters relative to this application electronically.

SECTION 5 - AUTHORIZED AGENT INFORMATION (Env-Wt 311.04(c))

☐ N/A

LAST NAME, FIRST NAME, M.I.: Peace, Kimberly R.

COMPANY NAME: Hoyle, Tanner & Associates, Inc.		MAILING ADDRESS: 150 Dow Street	
TOWN/CITY: Manchester		STATE: NH	ZIP CODE: 03101
EMAIL ADDRESS: kpeace@hoyletanner.com	FAX: 603-669-4168	PHONE: 603-669-5555 ext. 151	
ELECTRONIC COMMUNICATION: By initialing here <u>KRP</u> , I hereby authorize NHDES to communicate all matters relative to this application electronically.			
SECTION 6 - PROPERTY OWNER INFORMATION (If different than applicant) (Env-Wt 311.04(b)) If the owner is a trust or a company, then the name of the trust or company should be written as the owner's name. <input checked="" type="checkbox"/> Same as applicant			
NAME: <input type="text"/>			
MAILING ADDRESS: <input type="text"/>			
TOWN/CITY: <input type="text"/>		STATE: <input type="text"/>	ZIP CODE: <input type="text"/>
EMAIL ADDRESS: <input type="text"/>	FAX: <input type="text"/>	PHONE: <input type="text"/>	
ELECTRONIC COMMUNICATION: By initialing here _____, I hereby authorize NHDES to communicate all matters relative to this application electronically.			
SECTION 7 - RESOURCE-SPECIFIC CRITERIA ESTABLISHED IN Env-Wt 400, Env-Wt 500, Env-Wt 600, Env-Wt 700, OR Env-Wt 900 HAVE BEEN MET (Env-Wt 313.01(a)(3)).			
Describe how the resource-specific criteria have been met (please attach information about stream crossings, coastal resources, prime wetlands, or non-tidal wetlands and surface waters). In accordance with Env-Wt 400 the jurisdictional areas within the project limits have been delineated by Stoney Ridge Environmental, LLC. A copy of the Wetland Report is included with this application. The jurisdictional areas are referenced on the included wetland impact plan. The project has been designed in accordance with, Env-Wt 514.02, Env-Wt 514.03, Env-Wt 514.04, Env-Wt 514.05. Env-Wt, and 514.06. Project specific information is contained within this permit application.			
SECTION 8 - AVOIDANCE AND MINIMIZATION			
Impacts within wetland jurisdiction must be avoided to the maximum extent practicable (Env-Wt 313.03(a)). If all impacts cannot be avoided, a functional assessment is required for minor and major projects (Env-Wt 311.03(b)(10)). Any project with unavoidable jurisdictional impacts must then be minimized as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization and the Wetlands Permitting: Avoidance, Minimization and Mitigation Fact Sheet . Please refer to the application checklist to ensure that you have attached all documents related to avoidance and minimization, as well as functional assessment (where applicable). You can use the Avoidance and Minimization Checklist , the Avoidance and Minimization Narrative , or your own avoidance and minimization narrative. An annotated functional assessment has been provided by Stoney Ridge Environmental and is included in the attached Wetland Delineation Report. The Avoidance and Minimization Checklist is attached.			

SECTION 9 - MITIGATION REQUIREMENT (Env-Wt 311.02)

If unavoidable jurisdictional impacts require mitigation, a mitigation pre-application meeting must occur at least 30 days but not more than 90 days prior to submitting this Standard Dredge and Fill Permit Application.

Mitigation Pre-Application Meeting Date: Month: **6** Day: **18** Year: **2020**

☒ N/A - Mitigation is not required)

SECTION 10 - THE PROJECT MEETS COMPENSATORY MITIGATION REQUIREMENTS (Env-Wt 313.01(a)(1)c).

Have you submitted a compensatory mitigation proposal that meets the requirements of Env-Wt 800 for all permanent impacts that will remain after avoidance and minimization demonstration?

☐ Yes ☐ No

☒ N/A - Mitigation is not required)

SECTION 11 - IMPACT AREA (Env-Wt 311.04(g))

For each jurisdictional area that will be/has been impacted, provide square feet (SF) and, if applicable, linear feet (LF) of impact, and note whether the impact is after-the-fact (ATF; i.e., work was started or completed without required permitting).

For intermittent and ephemeral* streams, the linear footage of impact is measured along the thread of the channel.

**Please note, installation of a stream crossing in an ephemeral stream may be undertaken without a permit per Rule Env-Wt 309.02(d), however other dredge or fill impacts should be included below.*

For perennial streams/rivers, the linear footage of impact is calculated by summing the lengths of disturbances to the channel and banks.

Permanent impacts are impacts that will remain after the project is complete (e.g., changes in grade or surface materials).

Temporary impacts are impacts not intended to remain (and will be restored to pre-construction conditions) after the project is completed.

JURISDICTIONAL AREA		PERMANENT			TEMPORARY		
		SF	LF	ATF	SF	LF	ATF
Wetlands	Forested Wetland			<input type="checkbox"/>	111		<input type="checkbox"/>
	Scrub-shrub Wetland			<input type="checkbox"/>			<input type="checkbox"/>
	Emergent Wetland			<input type="checkbox"/>			<input type="checkbox"/>
	Wet Meadow			<input type="checkbox"/>			<input type="checkbox"/>
	Vernal Pool			<input type="checkbox"/>			<input type="checkbox"/>
	Designated Prime Wetland			<input type="checkbox"/>			<input type="checkbox"/>
	Duly established 100-foot Prime Wetland Buffer			<input type="checkbox"/>			<input type="checkbox"/>
Surface Water	Intermittent / Ephemeral* Stream			<input type="checkbox"/>			<input type="checkbox"/>
	Perennial Stream or River	4265	81	<input type="checkbox"/>	2811	116	<input type="checkbox"/>
	Lake / Pond			<input type="checkbox"/>			<input type="checkbox"/>
	Docking - Lake / Pond			<input type="checkbox"/>			<input type="checkbox"/>
	Docking – River			<input type="checkbox"/>			<input type="checkbox"/>
Banks	Bank - Intermittent Stream			<input type="checkbox"/>			<input type="checkbox"/>
	Bank - Perennial Stream / River	340	76	<input type="checkbox"/>	1117		<input type="checkbox"/>
	Bank/shoreline - Lake / Pond			<input type="checkbox"/>			<input type="checkbox"/>
Tidal	Tidal Waters			<input type="checkbox"/>			<input type="checkbox"/>
	Tidal Marsh			<input type="checkbox"/>			<input type="checkbox"/>

Sand Dune			<input type="checkbox"/>			<input type="checkbox"/>
Undeveloped Tidal Buffer Zone (TBZ)			<input type="checkbox"/>			<input type="checkbox"/>
Previously developed TBZ			<input type="checkbox"/>			<input type="checkbox"/>
Docking - Tidal Water			<input type="checkbox"/>			<input type="checkbox"/>
TOTAL	4605	157		4039	116	

SECTION 12 - APPLICATION FEE (RSA 482-A:3, I)
☐ **MINIMUM IMPACT FEE:** Flat fee of \$400

☐ **NON-ENFORCEMENT RELATED, PUBLICLY-FUNDED AND SUPERVISED RESTORATION PROJECTS, REGARDLESS OF IMPACT CLASSIFICATION:** Flat fee of \$400 (refer to RSA 482-A:3, 1(c) for restrictions)

☒ **MINOR OR MAJOR IMPACT FEE:** Calculate using the table below:

Permanent and temporary (non-docking):	SF 8644	×	\$0.40 =	\$ 3,457.60
Seasonal docking structure:	SF	×	\$2.00 =	\$
Permanent docking structure:	SF	×	\$4.00 =	\$
Projects proposing shoreline structures (including docks) add \$400 =				\$
Total =				\$ 3,457.60
The application fee for minor or major impact is the above calculated total or \$400, whichever is greater =				\$ 3,457.60

SECTION 13 - PROJECT CLASSIFICATION (Env-Wt 306.05)

Indicate the project classification.



☐ Minimum Impact Project

☐ Minor Project

☒ Major Project
SECTION 14 - REQUIRED CERTIFICATIONS (Env-Wt 311.11)**Initial each box below to certify:**

Initials: DS	To the best of the signer's knowledge and belief, all required notifications have been provided.
Initials: DS	The information submitted on or with the application is true, complete, and not misleading to the best of the signer's knowledge and belief.
Initials: DS	<p>The signer understands that:</p> <ul style="list-style-type: none"> The submission of false, incomplete, or misleading information constitutes grounds for NHDES to: <ol style="list-style-type: none"> Deny the application. Revoke any approval that is granted based on the information. And If the signer is a certified wetland scientist, licensed surveyor, or professional engineer licensed to practice in New Hampshire, refer the matter to the joint board of licensure and certification established by RSA 310-A:1. The signer is subject to the penalties specified in New Hampshire law for falsification in official matters, currently RSA 641. The signature shall constitute authorization for the municipal conservation commission and the Department to inspect the site of the proposed project, except for minimum impact trail projects, where the signature shall authorize only the Department to inspect the site pursuant to RSA 482-A:6, II.
Initials: DS	If the applicant is not the owner of the property, each property owner signature shall constitute certification by the signer that he or she is aware of the application being filed and does not object to the filing.

SECTION 15 - REQUIRED SIGNATURE (Env-Wt 311.04(d); Env-Wt 311.11)

SIGNATURE (OWNER) 	PRINT NAME LEGIBLY: David Scott, PE	DATE: 7/8/2020
SIGNATURE (APPLICANT, IF DIFFERENT FROM OWNER):	PRINT NAME LEGIBLY:	DATE:
SIGNATURE (AGENT, IF APPLICABLE): 	PRINT NAME LEGIBLY: Kimberly Peace	DATE: 7/7/2020

SECTION 16 - TOWN / CITY CLERK SIGNATURE (Env-Wt 311.04(f))

As required by RSA 482-A:3, I(a),(1), I hereby certify that the applicant has filed four application forms, four detailed plans, and four USGS location maps with the town/city indicated below.

TOWN/CITY CLERK SIGNATURE: _____

PRINT NAME LEGIBLY:

TOWN/CITY:

DATE:

DIRECTIONS FOR TOWN/CITY CLERK:

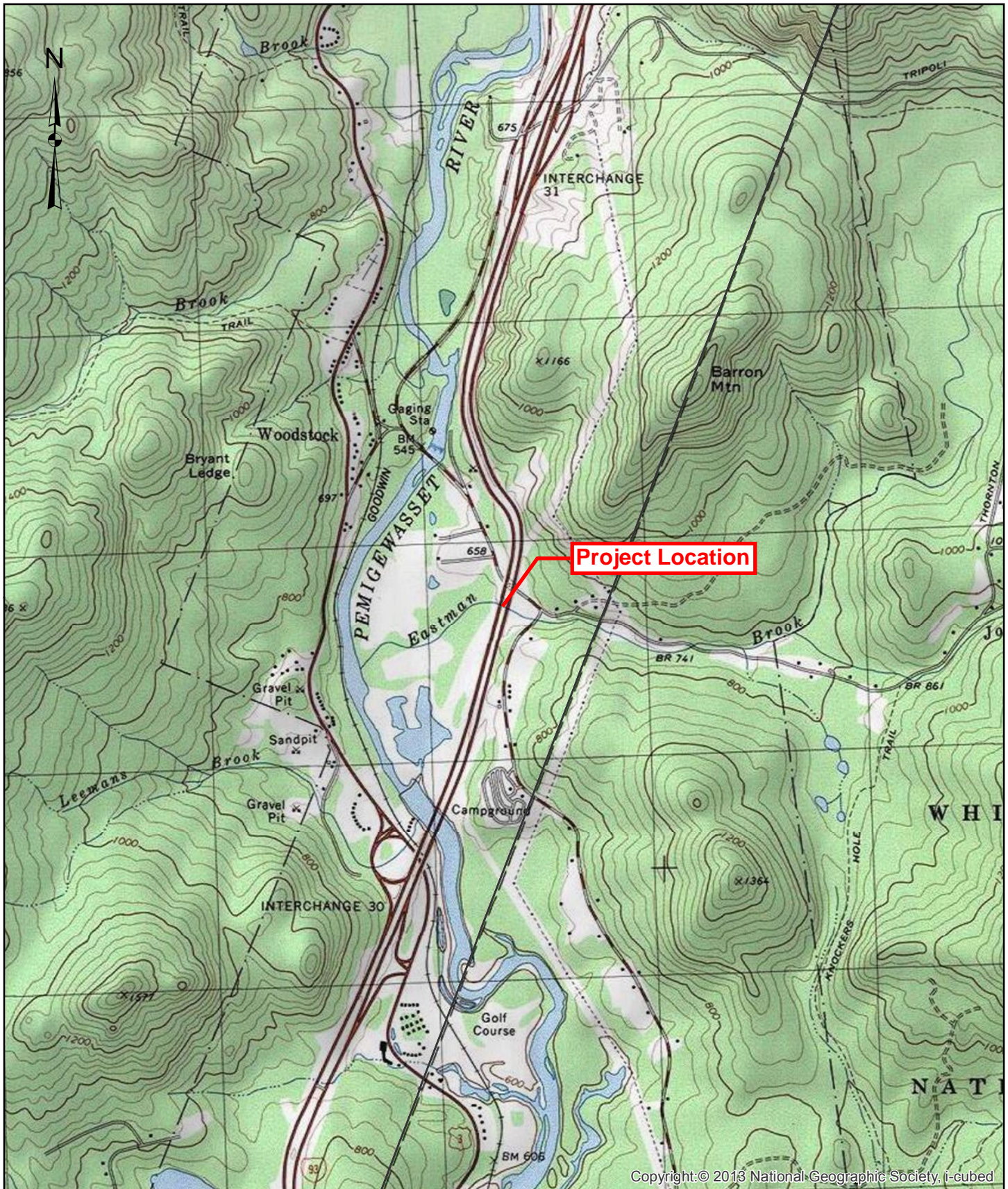
Per RSA 482-A:3, I(a)(1)


1. IMMEDIATELY sign the original application form and four copies in the signature space provided above.
2. Return the signed original application form and attachments to the applicant so that the applicant may submit the application form and attachments to NHDES by mail or hand delivery.
3. IMMEDIATELY distribute a copy of the application with one complete set of attachments to each of the following bodies: the municipal Conservation Commission, the local governing body (Board of Selectmen or Town/City Council), and the Planning Board. And
4. Retain one copy of the application form and one complete set of attachments and make them reasonably accessible for public review.

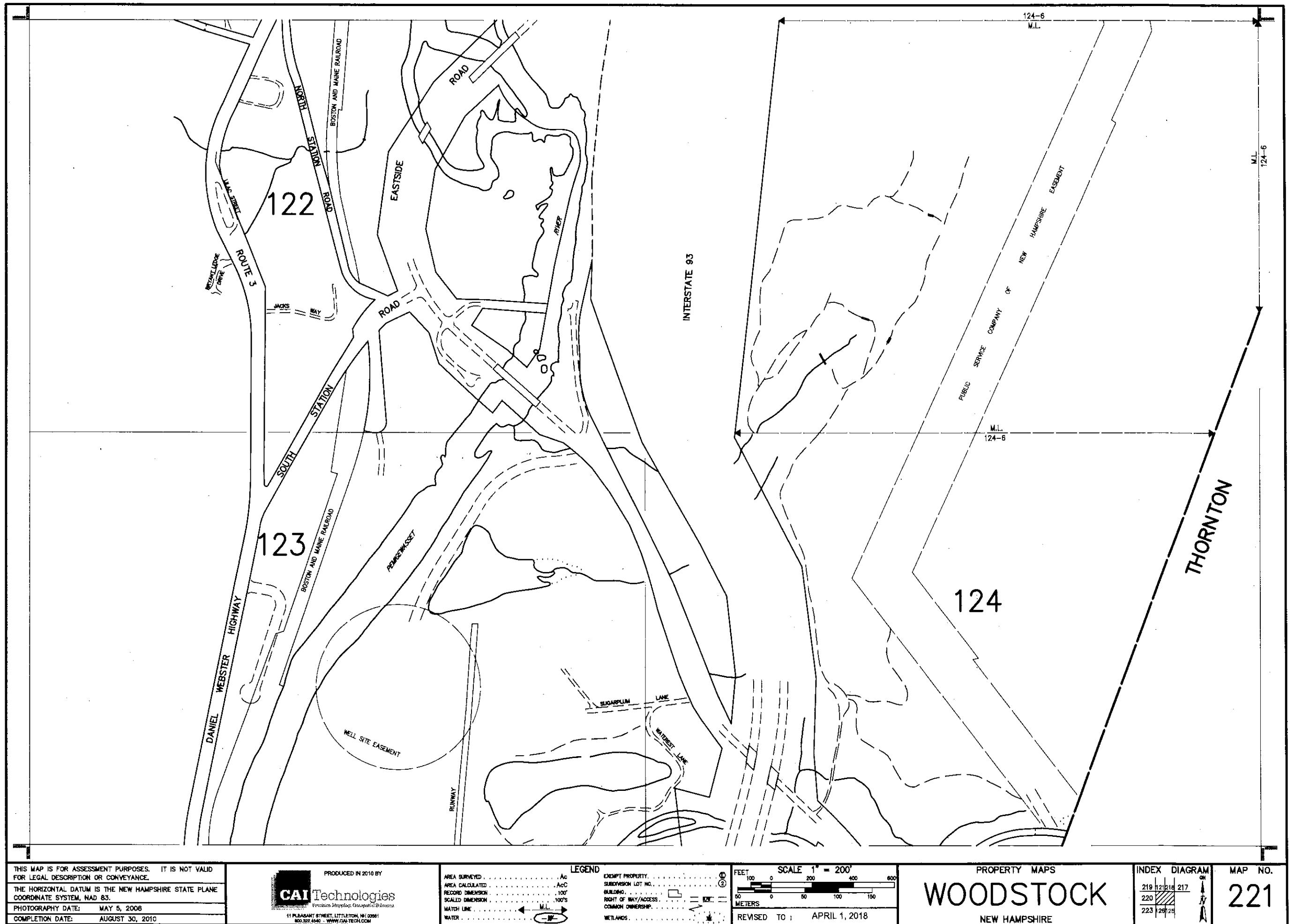
Please refer to Env-wt 311.05(a)(14) & RSA 482-A:3I(a)(1)
The four (4) town copies have been sent via certified mail and filed directly with the town in accordance with the above rule and regulation.

DIRECTIONS FOR APPLICANT:

Submit the single, original permit application form bearing the signature of the Town/City Clerk, additional materials, and the application fee to NHDES by mail or hand delivery at the address at the bottom of this page.



<div><div>150 Dow Street Manchester, NH 03101-1227 Tel 603-669-5555 Fax 603-669-4168 Web Page www.hoyletanner.com</div></div>			NHDOT 41915 SCOUR STABILIZATION PROJECT WOODSTOCK BRIDGE 203-079 INTERSTATE 93 OVER EASTMAN BROOK		MAP 8
DR. BY jtheriault	DATE 9/5/2019	SCALE 1 inch = 2,000 feet	PROJECT LOCATION MAP		



THIS MAP IS FOR ASSESSMENT PURPOSES. IT IS NOT VALID FOR LEGAL DESCRIPTION OR CONVEYANCE.

THE HORIZONTAL DATUM IS THE NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM, NAD 83.

PHOTOGRAPHY DATE: MAY 5, 2008

COMPLETION DATE: AUGUST 30, 2010

PRODUCED IN 2010 BY

CAI Technologies

11 PLEASANT STREET, LITTLETON, NH 03061
603.222.6642 - WWW.CAITECH.COM

LEGEND

AREA SURVEYED Ac

AREA CALCULATED AcC

RECORD DIMENSION 100'

SCALED DIMENSION 100'S

MATCH LINE M.L.

WATER W

EMPTY PROPERTY E

SUBDIVISION LOT NO. LOT

BUILDING B

RIGHT OF WAY/ACCESS R

COMMON OWNERSHIP CO

WETLANDS W

SCALE 1" = 200'

FEET 0 100 200 400 600

METERS 0 50 100 150

REVISED TO: APRIL 1, 2018

PROPERTY MAPS

WOODSTOCK

NEW HAMPSHIRE

INDEX DIAGRAM

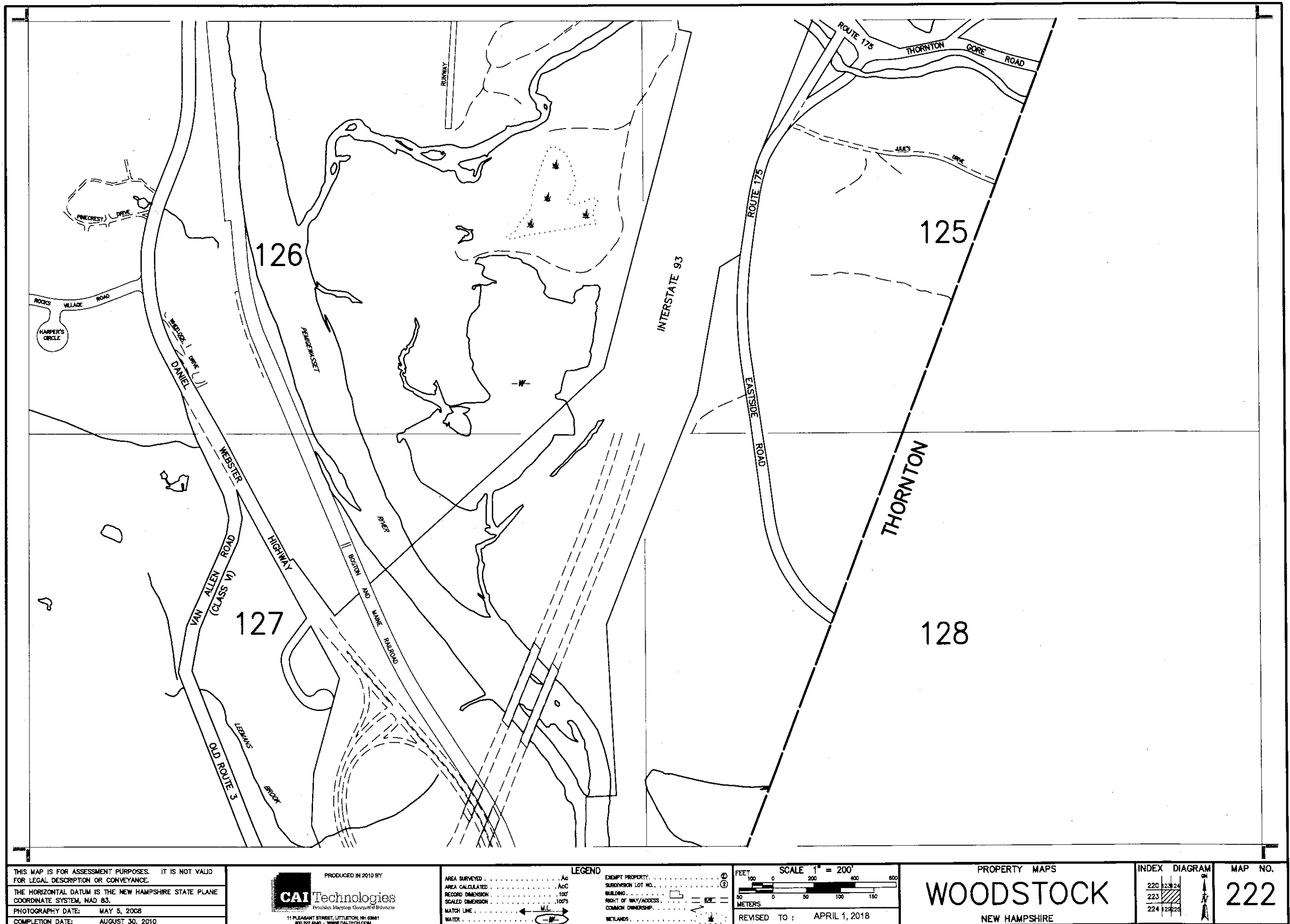
219 217

220 218

223 216

MAP NO.

221



THIS MAP IS FOR ASSESSMENT PURPOSES. IT IS NOT VALID FOR LEGAL DESCRIPTION OR CONVEYANCE.

THE HORIZONTAL DATUM IS THE NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM, NAD 83.

PHOTOGRAPHY DATE: MAY 5, 2008

COMPLETION DATE: AUGUST 30, 2010

PRODUCED IN 2010 BY

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11 PLEASANT STREET, LITTLETON, NH 03041
800.322.6640 - WWW.CAI-TECH.COM

AREA SURVEYED Ac
AREA CALCULATED Ac
RECORD DIMENSION 100'
SCALED DIMENSION 100'
MATCH LINE M.L.
WATER

LEGEND

EXEMPT PROPERTY
SUBDIVISION LOT NO.
BUILDING
RIGHT OF WAY/ACCESS
COMMON OWNERSHIP
WETLANDS

SCALE 1" = 200'

FEET 0 100 200 300 400 500 600
METERS 0 50 100 150

REVISED TO: APRIL 1, 2018

PROPERTY MAPS

WOODSTOCK

NEW HAMPSHIRE

INDEX DIAGRAM

220 123 24
223
224 123 25

MAP NO.

222



STANDARD DREDGE AND FILL WETLANDS PERMIT APPLICATION ATTACHMENT A: MINOR AND MAJOR PROJECTS



Water Division/Land Resources Management

Wetlands Bureau

[Check the Status of your Application](#)

RSA/ Rule: RSA 482-A/ Env-Wt 311.10; Env-Wt 313.01(a)(1); Env-Wt 313.03

APPLICANT LAST NAME, FIRST NAME, M.I.: NH Dept. of Transportation

Attachment A can be used to satisfy some of the additional requirements for minor and major projects regarding avoidance and minimization, as well as functional assessment.

PART I: AVOIDANCE AND MINIMIZATION

In accordance with Env-Wt 313.03(a), the Department shall not approve any alteration of any jurisdictional area unless the applicant demonstrates that the potential impacts to jurisdictional areas have been avoided to the maximum extent practicable and that any unavoidable impacts have been minimized, as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization.

SECTION I.I - ALTERNATIVES (ENV-WT 313.03(B)(1))

Describe how there is no practicable alternative that would have a less adverse impact on the area and environments under the Department's jurisdiction.

Streambed and bank impacts have been minimized to the extent practicable while meeting the project purpose and need of repairing existing scour damage and preventing additional undermining of the structure in the future. Due to Eastman Brook's high velocities of 29.2 cubic feet per second (CFS) during the 100-year design storm, as shown in the attached hydraulic analysis, soft or bioengineered bank materials discussed in Env-Wt 514.02 would wash downstream, leaving an exposed streambed and crossing structure vulnerable to further scour damage. The proposed project includes installation of A-Jacks interlocking armor units as indicated on the attached plans. An A-Jacks matrix pattern leaves voids, which will provide support for clean washed gravel and stone in the vulnerable streambed. This strategy will dissipate outlet stream energy and resist further scour and erosion in the streambed while minimizing depth of impact to the streambed compared to riprap armoring.

SECTION I.II - MARSHES (ENV-WT 313.03(B)(2))

Describe how the project avoids and minimizes impacts to tidal marshes and non-tidal marshes where documented to provide sources of nutrients for finfish, crustacea, shellfish and wildlife of significant value.

N/A – this project is not located within tidal waters or marshes.

SECTION I.III – HYDROLOGIC CONNECTION (ENV-WT 313.03(B)(3))

Describe how the project maintains hydrologic connections between adjacent wetland or stream systems.

The proposed scour protection work will improve and restore connectivity. The crossing currently has a large perched outlet. The A Jacks scour protection will be graded to match the outlet invert and eliminate the perched outlet condition, and therefore improving connectivity.

SECTION I.IV - JURISDICTIONAL IMPACTS (ENV-WT 313.03(B)(4))

Describe how the project avoids and minimizes impacts to wetlands and other areas of jurisdiction under RSA 482-A, especially those in which there are exemplary natural communities, vernal pools, protected species and habitat, documented fisheries, and habitat and reproduction areas for species of concern, or any combination thereof.

Impacts to the jurisdictional bank and bed of Eastman Brook are necessary to protect the undermined structure and prevent additional scour, but these impacts have been minimized to the extent practicable. There are no exemplary natural communities, vernal pools, protected species or protected habitat, documented fisheries, or habitat and reproduction areas for species of concern that will be affected by the project.

SECTION I.V - PUBLIC COMMERCE, NAVIGATION, OR RECREATION (ENV-WT 313.03(B)(5))

Describe how the project avoids and minimizes impacts that eliminate, depreciate or obstruct public commerce, navigation, or recreation.

The proposed scour stabilization project will have a positive effect on public commerce. The project will enhance roadway safety to the traveling public by diminishing undermining of an existing structure on an Interstate Highway serving as the primary access route to many of the state's tourism resources.

The project will have no impact on navigation or recreation. The US Coast Guard, in an April 30, 2020 Determination of Navigability, concluded that Eastman Brook at the crossing location is not a Navigable Water of the United States.

SECTION I.VI - FLOODPLAIN WETLANDS (ENV-WT 313.03(B)(6))

Describe how the project avoids and minimizes impacts to floodplain wetlands that provide flood storage.

The proposed project will have no impact on floodplain wetlands. Scour stabilization measures are proposed in the streambank and streambed of Eastman Brook. Stoney Ridge Environmental has provided a wetland delineation report (attached) showing the locations of floodplain wetland above the jurisdictional top-of-bank in the proposed work area. Impacts to these wetlands from temporary construction routes have been minimized to the extent practicable.

SECTION I.VII - RIVERINE FORESTED WETLAND SYSTEMS AND SCRUB-SHRUB –MARSH COMPLEXES (ENV-WT 313.03(B)(7))

Describe how the project avoids and minimizes impacts to natural riverine forested wetland systems and scrub-shrub – marsh complexes of high ecological integrity.

There are no scrub-shrub marsh complexes of high ecological integrity in the project area.

SECTION I.VIII - DRINKING WATER SUPPLY AND GROUNDWATER AQUIFER LEVELS (ENV-WT 313.03(B)(8))

Describe how the project avoids and minimizes impacts to wetlands that would be detrimental to adjacent drinking water supply and groundwater aquifer levels.

N/A

SECTION I.IX - STREAM CHANNELS (ENV-WT 313.03(B)(9))

Describe how the project avoids and minimizes adverse impacts to stream channels and the ability of such channels to handle runoff of waters.

Impacts to the Eastman Brook channel will be necessary to effectively stabilize the existing streambed and crossing structure as flow velocities at this location can reach 28 feet per second (fps) during a 50-year storm event. The proposed project includes installation of A-Jacks interlocking armor units to dissipate outlet stream energy and resist further scour and erosion in the streambed. This strategy minimizes depth of impact to the streambed compared to riprap armoring and leaves voids, which will provide support for clean washed gravel and stone in the vulnerable streambed. Effective stabilization of this crossing will improve Eastman Brook's ability to handle runoff waters by preventing downstream sedimentation caused by bank and bed erosion.

PART II: FUNCTIONAL ASSESSMENT**REQUIREMENTS**

Ensure that project meets requirements of Env-Wt 311.10 regarding functional assessment (Env-Wt 311.04(j); Env-Wt 311.10).

FUNCTIONAL ASSESSMENT METHOD USED:

Stoney Ridge Environmental, LLC has prepared a functional assessment using the US Army Corps Highway Methodology guidelines. A summary narrative of the assessment results is part of the Wetland Delineation Report included with this application.

NAME OF CERTIFIED WETLAND SCIENTIST (FOR NON-TIDAL PROJECTS) OR QUALIFIED COASTAL PROFESSIONAL (FOR TIDAL PROJECTS) WHO COMPLETED THE ASSESSMENT: CINDY BALCIUS, CWS

DATE OF ASSESSMENT: SEPTEMBER 2019

Check this box to confirm that the application includes a NARRATIVE ON FUNCTIONAL ASSESSMENT: ☒

For minor or major projects requiring a standard permit without mitigation, the applicant shall submit a wetland evaluation report that includes completed checklists and information demonstrating the RELATIVE FUNCTIONS AND VALUES OF EACH WETLAND EVALUATED. Check this box to confirm that the application includes this information, if applicable: ☒

Note: The Wetlands Functional Assessment worksheet can be used to compile the information needed to meet functional assessment requirements.



AVOIDANCE AND MINIMIZATION CHECKLIST

Water Division/Land Resources Management Wetlands Bureau

[Check the Status of your Application](#)



RSA/Rule: RSA 482-A/ Env-Wt 311.07(d)

This checklist can be used in lieu of the written narrative required by Env-Wt 311.07(a) to demonstrate compliance with requirements for Avoidance and Minimization (A/M), pursuant to RSA 482-A:1 and Env-Wt 311.07(d).

“A/M BMPs” stands for [Wetlands Best Management Practice Techniques for Avoidance and Minimization](#) dated 2019, published by the New England Interstate Water Pollution Control Commission (Env-Wt 102.18).

“Practicable” means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes (Env-Wt 103.62).

SECTION 1 – CONTACT/LOCATION INFORMATION		
APPLICANT LAST NAME, FIRST NAME, M.I.: NH Dept. of Transportation		
PROJECT STREET ADDRESS: N/A	PROJECT TOWN: Woodstock	
TAX MAP/LOT NUMBER: N/A		
SECTION 2 - PRIMARY PURPOSE OF THE PROJECT		
Env-Wt 311.07(b)(1)	Indicate whether the primary purpose of the project is to construct a water-access structure or requires access through wetlands to reach a buildable lot or the buildable portion thereof.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If you answered “no” to this question, describe the purpose of the “non-access” project type you have proposed: The purpose of the project is to maintain safety and protect the traveling public by addressing hydraulic scour damage compromising the safety of the bridge conveying Eastman Brook at its crossing under Interstate 93 in Woodstock.		

SECTION 3 - AVOIDANCE PROJECT DESIGN TECHNIQUES		
Check the appropriate boxes below in order to demonstrate that these items have been considered in the planning of the project. Use N/A (not applicable) for each technique that is not applicable to your project.		
Env-Wt 311.07(b)(2)	For any project that proposes permanent impacts of more than one acre or that proposes permanent impacts to a Priority Resource Area (PRA), or both, whether any other properties reasonably available to the applicant, whether already owned or controlled by the applicant or not, could be used to achieve the project’s purpose without altering the functions and values of any jurisdictional area, in particular wetlands, streams, and PRAs.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A

Env-Wt 311.07(b)(3)	Whether alternative designs or techniques, such as different layouts, construction sequencing, or alternative technologies could be used to avoid impacts to jurisdictional areas or their functions and values on the subject property or on another property reasonably available to the applicant.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(1)	The results of the functional assessment required by Env-Wt 311.03(b)(10) were used to select the location of the proposed project having the least impact to wetland functions.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(2)	The proposed project has been designed to have the least impact to wetland functions.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(3)	Where impact to wetland functions is unavoidable, the proposed impacts are limited to the wetlands with the least valuable functions on the site while avoiding and minimizing impacts to the wetlands with the highest and most valuable functions.	<input checked="" type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 313.01(c)(1)-(2) Env-Wt 313.03(b)(1)	No practicable alternative would reduce adverse impact on the area and environments and the project will not cause random or unnecessary destruction of wetlands.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 313.01(c)(3)	The project would not cause or contribute to the significant degradation of waters of the state or the loss of any PRAs.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 313.03(b)(2)	The project avoids impacts to marshes that are documented to provide sources of nutrients for finfish, crustacea, shellfish, and wildlife of significant value.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 313.03(b)(3) Env-Wt 904.07(c)(8)	The project maintains hydrologic connectivity between adjacent wetlands or stream systems.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 311.01(b) Env-Wt 313.03(b)(4)	The project avoids and minimizes impacts to wetlands and other areas of jurisdiction under RSA 482-A, especially those in which there are exemplary natural communities, vernal pools, protected species and habitat, documented fisheries, and habitat and reproduction areas for species of concern.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 313.03(b)(5)	The project avoids and minimizes impacts that eliminate, depreciate, or obstruct public commerce, navigation, or recreation.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 311.10 A/M BMPs	Buildings and/or access are positioned away from high function wetlands or surface waters to avoid impact.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 311.10 A/M BMPs	The project clusters structures to avoid wetland impacts.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 311.10 A/M BMPs	The placement of roads and utility corridors avoids wetlands and their associated streams.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A

A/M BMPs	Proposed utilities are suspended from bridges to avoid trenching through wetlands.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
A/M BMPs	The width of access roads or driveways is reduced to avoid and minimize impacts. Pullouts are incorporated in the design as needed.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
A/M BMPs	Retaining walls are proposed to avoid placing fill in wetlands. The retaining walls would not block hydrology or wildlife corridors.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
A/M BMPs	The project proposes bridges or spans instead of roads/driveways/trails with culverts.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
A/M BMPs	Natural topography is incorporated in the design to avoid grading.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
SECTION 4 - MINIMIZATION DESIGN TECHNIQUES		
Env-Wt 311.10	The project was designed to minimize impacts to higher-quality wetlands.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 311.01(b) Env-Wt 313.03(b)	The project was designed to minimize impacts to habitat, reproduction areas, fishery, vernal pools, or protected species or habitat.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
A/M BMPs	The project was designed to minimize the number of crossings and their size.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
A/M BMPs	Wetlands and streams are proposed to be crossed at their narrowest point.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 500 Env-Wt 600 Env-Wt 900	Wetland and stream crossings include features that accommodate aquatic organism passage and wildlife passage.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 313.01(c)(1) Env-Wt 313.03(b)(6)	The project was designed to avoid and minimize impacts to floodplain wetlands that provide flood storage.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 313.01(c)(1) Env-Wt 313.03(b)(7)	Impacts to natural riverine forested wetlands systems and scrub-shrub marsh complexes of high ecologic integrity are avoided and minimized.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 313.01(c)(1) Env-Wt 313.03(b)(8)	Impacts to wetlands that would be detrimental to drinking water supply and groundwater aquifer levels are avoided and minimized.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 313.01(c)(1) Env-Wt 313.03(b)(9)	Adverse impacts to stream channels and their ability to handle stormwater runoff are avoided and minimized.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 900	Stream crossings are sized to address hydraulic capacity and geomorphic compatibility.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
A/M BMPs	Disturbed areas are used for crossings wherever practicable, including existing roadways, paths, or trails upgraded with new culverts or bridges.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A

RSA 482-A:11, II	Project is designed to minimize impacts to abutting properties.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 307.13	Setbacks from property lines required by Env-Wt 307.13 are maintained.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
SECTION 5 - RESOURCE-SPECIFIC DESIGN TECHNIQUES		
Env-Wt 500	The project is designed to address resource-specific avoidance and minimization criteria for non-tidal jurisdictional areas.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 600	The project is designed to address resource-specific avoidance and minimization criteria for coastal lands and tidal waters/wetlands.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 307.08 Env-Wt 700	The project is designed to address resource-specific avoidance and minimization criteria for designated prime wetlands.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
SECTION 6 - PROJECT-SPECIFIC DESIGN TECHNIQUES		
Env-Wt 500	The project is designed to use techniques outlined in Env-Wt 500 for projects in non-tidal jurisdictional areas.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 600	The project is designed to use techniques outlined in Env-Wt 600 for projects in coastal lands and tidal waters/wetlands.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 900	The project is designed to use stream crossing techniques outlined in Env-Wt 900 for stream crossing projects.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A

Bank/Shoreline Stabilization Project-Specific Worksheet



BANK/ShORELINE STABILIZATION PROJECT-SPECIFIC WORKSHEET FOR STANDARD APPLICATION

Water Division/Land Resources Management
Wetlands Bureau

[Check the Status of your Application](#)



RSA/Rule: RSA 482/ Env-Wt 514

APPLICANT LAST NAME, FIRST NAME, M.I.: **NH Dept. of Transportation**

This worksheet summarizes the criteria and requirements for a Standard Permit for all types of “bank/shoreline stabilization” projects, as outlined in Chapter Env-Wt 500. In addition to the project-specific criteria and requirements on this worksheet, all Standard Applications must meet the criteria and requirements listed in the [Standard Dredge and Fill Wetlands Permit Application form \(NHDES-W-06-012\)](#).

Do **not** use this worksheet if the project is located in a coastal (tidal) area (Env-Wt 509.02(b)).

SECTION 1 - APPROVAL CRITERIA (Env-Wt 514.02)

An application for bank/shoreline stabilization must meet the following approval criteria:

- ☒ The project must meet the applicable conditions established in Env-Wt 300.
- ☒ For a hard-scape stabilization proposal, such as rip-rap or a retaining wall, the applicant must demonstrate that the bank or shoreline in that location cannot be stabilized by preserving natural vegetation, landscaping, or bioengineering.
- ☒ Bank/shoreline stabilization must be designed to be the least intrusive practicable method in accordance with Chapter 8 of the [Wetlands Best Management Practice Techniques for Avoidance and Minimization \(A/M BMPs\)](#).
- ☒ Bank/shoreline stabilization must conform to the natural alignment of the bank/shoreline.
- ☒ Bank/shoreline stabilization must not adversely affect the stream course such that water flow will be transported by the stream channel in a manner that the stream maintains its dimensions, general pattern, and slope with no unnatural raising or lowering of the channel bed elevation along the stream bed profile.
- ☒ Bank/shoreline stabilization must not adversely affect the physical stream forms or alter the local channel hydraulics, natural stream bank stability, or floodplain connectivity.
- ☒ Bank/shoreline stabilization must avoid and minimize impacts to shoreline resource functions as described in Env-Wt 514.01 and Chapter 8 of the [A/M BMPs](#).
- ☐ If the project is a wall on a great pond or other surface water where the state holds fee simple ownership of the bed, bank/shoreline stabilization must locate the wall on the shoreward side of the normal high water line.
- ☐ If the project is to install rip-rap, bank/shoreline stabilization must locate the rip-rap shoreward of the normal high water line, where practicable, and extend it not more than two feet lakeward of that line at any point.
- ☒ The hierarchy of bank stabilization practices must be as follows:
 - (1) Soft vegetative bank stabilization, including regrading and replanting of slopes, in which all work occurs above ordinary high water or normal high water,
 - (2) Bioengineered bank stabilization or naturalized design techniques that uses a combination of live vegetation, woody material, or geotextile matting and may include regrading and replanting of slopes,

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- (3) Semi-natural form design shall be allowed only where the applicant demonstrates that anticipated turbulence, flows, restricted space, or similar factors, render vegetative or soft stabilization methods, bioengineering, and natural process design stabilization methods physically impractical,
- (4) Hard-scape or rip-rap design shall be allowed only where anticipated turbulence, flows, restricted space, or similar factors render vegetative, bio-engineering, semi-natural form design and diversion methods physically impractical and where necessary to protect existing infrastructure, and
- (5) Wall construction shall be allowed as the last available option, only where lack of space or other limitations of the site make alternative stabilization methods of bioengineering, seminatural, and rip-rap impractical. Wherever sufficient room exists, slopes shall be cut back to eliminate the requirement for a wall.

☒ Stream bank-stabilization project plans must be developed in accordance with the following techniques, as applicable:

- Naturalized and semi-natural design techniques where practicable in accordance with the [Guidelines for Naturalized River Channel Design and Bank Stabilization](#) dated February 2007; R. Schiff, J.G. MacBroom, and J. Armstrong Bonin.
- For bioengineering projects, [National Engineering Handbook Part 654 \(NEH 654\), Technical Supplement 141, Streambank Soil Bioengineering](#), dated August 2007, USDA NRCS.
- For stream restoration projects, [NEH 654, Stream Restoration Design](#), dated August 2007, USDA NRCS.

SECTION 2 - APPLICATION REQUIREMENTS FOR ALL BANK/ShORELINE STABILIZATION PROJECTS (Env-Wt 514.03)

An application for any bank/shoreline stabilization project must include:

☒ A narrative and photos that:

- Describe and illustrate existing conditions and locations where shoreline vegetation currently exists.

The wetland permit application includes a Wetland Delineation and Invasive Species Report by Stoney Ridge Environmental, LLC (SRE). Wetlands were delineated by Cindy Balcius, CWS number 061. Photos are contained within this report, and additional photos are included in the permit application package.

As seen in the photos, each of the four wings and banks at the bridge were previously armored. The bank then transitions into natural vegetation which includes ground cover, shrubs, and trees. The extent to which the riprap currently exists can be seen in the photos provided with the application as well as on the impact plans.

- Identify all known causes of erosion to the bank/shoreline in that location.

Eastman's Brook through the crossing and in the project location experiences high velocities of 29.2 cubic feet per second (CFS) during the 100-yr design storm, as detailed in the hydraulic analysis included in the wetland permit application. The upstream banks are stable, however, downstream of the crossing, the high flows have eroded the banks on both sides of the river and are jeopardizing the stability of the bridge and abutments.

Because the crossing is slightly narrower than the stream, the flows through the crossing increase in velocity as water passes through it, eroding the streambed downstream of the crossing. The bridge cannot be replaced with a larger structure at this time, and the purpose of the project is to stabilize the bridge and abutments of this important piece of infrastructure.

- Identify information and, for minor and major projects, engineering standards used to determine the appropriateness of the proposed bank stabilization treatment or practice.

Refer to the attached hydrologic analysis for details regarding the type of analysis that was performed. Using that analysis, the maximum velocity in the channel for the 100-year storm event is 29.2 feet per second. Preliminary analysis using Design Guideline 14 in the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 23 (HEC-23), volume 2, showed that stone riprap with a minimum diameter of 6' would be necessary to adequately provide a static stream bottom to mitigate headcutting and undermining of the existing structure, as well as to further mitigate bend propagation downstream of the structure. This would be infeasible because the required stone size would necessitate an excavation depth of approximately 12'. The high velocity coupled with the observed scour at the outlet necessitates the installation of 48" A-Jacks to prevent scour. The A-Jacks revetment was designed to resist scour per Clopper, P.E. and M.S. Byars, 1999 publication. The A-Jacks are buried at the downstream end of the revetment to prevent contraction scour and headcutting. Class IX stone will also be installed at the sides of the A-Jacks to provide additional stability. NHDOT specifications for this stone are included in the wetland permit application.

- Explain the design elements that have been incorporated to address erosion, by eliminating or minimizing the causes therefor.

As detailed in the wetland permit application supplemental narrative and answers to questions, the proposed design including the A-Jacks system has been developed for this site to specifically address the scouring and headcutting that is occurring downstream of the crossing. The high flows that occur in this location cannot be reduced, and the crossing cannot be replaced with a larger structure at this time. It is anticipated that the stabilization measures once implemented will result in a reduction in erosion in this location.

In addition to the A-Jacks system, angular riprap is proposed along the banks in order to allow for locking between stones, providing additional stability against high flows that could wash rounded stone away. The riprap will be infilled with streambed gravel so that there are no voids and flows are across the stone.

- For minor and major bank/shoreline stabilization projects or minimum impact bioengineering stream bank projects, identify the flood risk tolerance of the proposed treatment or practice using the appropriate technical guidance or national engineering handbook.

The bridge is a critical piece of infrastructure within the national Interstate system, with a low flood risk tolerance. The project goal is to protect this bridge by installing stabilization measures that will accommodate future flood events without impacting the bridge. Refer to the hydraulic analysis for more information on how the design meets the FHWA engineering standards.

A cross-section plan that shows:

- ☒ The difference in elevation between the lowest point of the bank/shoreline slope to be impacted by the construction and the highest point of the bank/shoreline slope to be impacted.
- ☒ The linear distance across the proposed project area as measured along a straight line between the highest and lowest point of the bank/shoreline slope to be impacted.
- ☒ The existing and proposed slope of the bank/shoreline.
- ☒ The normal high water line or ordinary high water mark, as applicable.

Hard-scape, rip-rap, or unnatural design plans that must include:

- ☒ Designation of minimum and maximum stone size.
- ☒ Gradation.
- ☒ Minimum rip-rap thickness.
- ☒ Type of bedding for stone.
- ☒ Cross-section and plan views of the proposed installation.
- ☒ A description of anticipated turbulence, flows, restricted space, or similar factors that would render vegetation and bioengineering stabilization methods physically impracticable.
- ☒ Engineering plans for rip-rap in excess of 100 linear feet along the bank or bed of a stream or river, including in-stream revetments, stamped by a professional engineer.
- ☒ If the project proposes rip-rap adjacent to great ponds or other surface waters where the state holds fee simple ownership to the bed, a stamped surveyed plan showing the location of the normal high water line and the footprint of the proposed project.

Design plans for a wall in non-tidal waters must include:

- ☐ Cross-section and plan views of the proposed installation and sufficient plans to clearly indicate the relationship of the project to fixed points of reference, abutting properties, and features of the natural shoreline.
- ☐ If the application is for a wall adjacent to a great pond or other surface water where the state holds fee simple ownership to the bed, a surveyed plan, stamped by a licensed land surveyor, showing the location of the normal high water line and the footprint of the proposed project.

SECTION 3 - DESIGN REQUIREMENTS FOR ALL BANK/ShORELINE STABILIZATION PROJECTS (Env-Wt 514.04)

In addition to meeting all applicable requirements in Env-Wt 300, bank/shoreline stabilization must be designed to:

- ☒ Incorporate stormwater diversion and retention to minimize erosion.
- ☒ Retain natural vegetation to the maximum extent possible.
- ☐ If space and soil conditions allow, cut back unstable banks to a flatter slope and then plant with native, non-invasive trees, shrubs, and groundcover.
- ☒ Avoid and minimize impacts to adjacent properties and infrastructure.
- ☒ Avoid and minimize impacts to water quality.
- ☒ Avoid and minimize impacts to priority resource areas, avian nesting areas, fish spawning locations, and other wildlife habitat to meet the requirements of Env-Wt 514.02.
- ☒ Incorporate naturalized and semi-natural design techniques where practicable in accordance with [Guidelines for Naturalized River Channel Design and Bank Stabilization](#) dated February 2007, R. Schiff, J.G. MacBroom, and J. Armstrong Bonin.
- ☒ For bioengineering projects, be in accordance with [NEH 654, Technical Supplement 141, Streambank Soil Bioengineering](#), dated August 2007, USDA NRCS.
- ☐ For stream restoration projects, be in accordance with [NEH 654, Stream Restoration Design](#), dated August, 2007, USDA NRCS.

SECTION 4 - CONSTRUCTION REQUIREMENTS FOR ALL BANK/ShORELINE STABILIZATION PROJECTS (Env-Wt 514.05)

In addition to all applicable construction standards specified in Env-Wt 300, the following apply to all bank/ shoreline stabilization projects:

NOTE: Angular riprap will be used per project specifications

- ☐ Materials used to emulate a natural channel bottom must:
 - Be consistent with materials identified in the reference reach, and
 - Not include any angular rip-rap or gravel unless specifically identified on the approved plan.
- ☐ Bank restoration must be constructed, landscaped, and monitored in a manner that will create a healthy riparian or lacustrine shoreline system.
- ☐ Bank/shoreline stabilization areas must:
 - (1) Have at least 75% successful establishment of vegetation after two growing seasons, or
 - (2) Be replanted and re-established until a functional lacustrine, wetland, or riparian system has been reestablished in accordance with the approved plans.
- ☒ Unless otherwise approved, construction must be performed during low flow or dry conditions.
- ☒ Where there is documented occurrence of a cold water fishery or protected species or habitat, unless a waiver of this condition is issued in writing by the department in consultation with the New Hampshire Fish and Game Department, work must occur:
 - During low-flow or dry conditions during the growing season, and
 - Prior to October 1.

- ☒ Work authorized must be carried out in accordance with Env-Wt 307 such that there are no discharges in or to spawning or nursery areas during spawning seasons.
- ☒ Work authorized must be carried out in accordance with Env-Wt 307 such that controls are in place to protect water quality and appropriate turbidity controls such that no turbidity escape the immediate dredge area and must remain until suspended particles have settled and water at the work site has returned to normal clarity.
- ☒ Within 60 days of completion of construction, the applicant must submit a post-construction report that:
 - Has been prepared by a professional engineer, certified wetland scientist, or qualified professional, as applicable, and
 - Contains a narrative, exhibits, and photographs, as necessary to report the status of the project area and restored jurisdictional area.

SECTION 5 - ON-GOING REQUIREMENTS FOR ALL BANK/Shoreline Stabilization Projects (Env-Wt 514.06)

The owner must monitor the project and take corrective measures if the area is inadequately stabilized or restored by:

- (a) Replacing fallen or displaced materials without a permit, where no machinery in the channel is required,
- (b) Identifying corrective actions and follow-up plans in accordance with Env-Wt 307, and
- (c) Filing appropriate application and plans where work exceeds (a), above.

SECTION 6 - BANK Stabilization Construction Project Classification (Env-Wt 514.07)

Refer to Env-Wt 514.07 for project classification.

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES
WETLAND PERMIT APPLICATION
for
Scour Stabilization of Bridge 203/079 – Interstate 93 over Eastman Brook
Woodstock, NH
Supplemental Narrative

The following information is offered as a supplement to the information provided in the Wetland Permit Application and Plans.

Resources:

Stoney Ridge Environmental, LLC (SRE) completed wetlands and stream delineations for nine (9) stream crossing locations as well as functions and values assessments for NHDOT's Statewide Scour Protection Project (Statewide, #41915). Wetlands were delineated in accordance with Env-Wt 406.01; SRE's methodology is described in the included Wetland Delineation Report. The Eastman Brook location in Woodstock is Site 9 in the report. SRE describes Eastman Brook as riverine, upper perennial with unconsolidated bottom composed of cobble-gravel and sand (R3UB1/2). The stream is "a shallow fast moving" system that flows west through the crossing. At the outlet, SRE delineated and denoted two streambed classifications (R3UB1/2 and R3US1/2) that are divided by a change in classification line style on the delineation key and are both considered jurisdictional channel. A summary narrative of the Functions and Values Assessment is part of the Wetland Delineation Report included with this application.

Explanation as to methods, timing, and manner as to how the project will meet applicable standard permit conditions required in Env-Wt 307 (Env-Wt 311.03(b)(7))

Env-Wt 307.02 (US Army Corps of Engineers (USACE) Conditions). Appendix B is attached to this permit application. NHDOT seeks and requests to receive review and approval by the Army Corps of Engineers through their General Permit and via submittal of this State wetlands permit application to NHDES.

Env-Wt 307.03 (Protection of Water Quality Required). The contractor shall be responsible for implementing Erosion and Sediment control measures in accordance with the "New Hampshire Stormwater Manual, Volume 3 Erosion and Sediment Controls during Construction" by NHDES. Erosion and siltation control measures will be installed by the Contractor prior to start of any work and will be maintained during the duration of the construction activities. It is the Contractor's responsibility to not cause violations of surface water quality standards. Upon completion of the project, the project will cause no adverse effects on the quality or quantity of surface or groundwater entering or exiting the project site.

Env-Wt 307.04 (Protection of Fisheries and Breeding Areas Required). Temporary work in the stream may result in suspended sediment however this will be temporary and all appropriate and required BMPs will be used to avoid and minimize discharges to the extent that spawning or nursery areas would be affected.

Env-Wt 307.05 (Protection Against Invasive Species Required) Stoney Ridge Environmental performed a Wetland Delineation of the project area and noted the following: "The invasive species Japanese barberry (*Berberis thunbergii*) was observed within the project area. The location of this invasive species is depicted on the [plan enclosed in the wetland report.]" Although the invasive plant population is not located within the proposed work area or construction access route, the project contractor will be aware of and conform with the requirements in Env-Wt 307.05 and will follow the invasive plant BMPs should additional invasive species be identified during site work.

Env-Wt 307.06 (Protection of Rare, Threatened or Endangered Species and Critical Habitat) The NH Natural Heritage Bureau was contacted regarding the proposed project (see attached letter NHB20-1199, dated 04/29/2020). The database check determined that, there are no recorded occurrences for sensitive species

near the project area.

An official Federally-listed species list was obtained from the US Fish and Wildlife Service (USFWS) using the Information for Planning and Conservation (IPAC) online tool on May 4, 2020 (Consultation Code 05E1NE00-2019-SLI-2792). The list includes the Federally-threatened Northern Long Eared Bat (*Myotis septentrionalis*; NLEB).

The proposed work would be consistent with the scope of actions included in the FHWA, Federal Rail Associated and Federal Transit Authority Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and NLEB revised on February 5, 2018. The online determination key through IPAC was used to determine that this project may and is likely to adversely affect NLEB due to the necessity of 11,450 square feet of tree clearing for construction access during the NLEB active season. USFWS concurred with this finding in a letter dated 6/11/2020.

Env-Wt 307.07 (Consistency Required with Shoreland Water Quality Protection Act). The project shall be conducted in compliance with applicable requirements of RSA 483-B and Env-Wq 1400 during and after construction. Shoreland permits will be required in order to complete the proposed work.

Env-Wt 307.08 (Protection of Designated Prime Wetlands and Duly-Established 100-Foot Buffers). N/A

Env-Wt 307.09 (Shoreline Structures). N/A

Env-Wt 307.10 (Dredging Activity Conditions) N/A

Env-Wt 307.11 (Filling Activity Conditions). All fill material shall conform to the requirements listed in 307.11.

Env-Wt 307.12 (Restoring Temporary Impacts: Site Stabilization) Upon completion of the project all temporary impact areas will be restored to the preconstruction condition per the requirements listed in Env-Wt 307.12.

Env-Wt 307.13 (Property Line Setbacks): Per Env-Wt 307.13(e)(1), consent is not required to be obtained from affected abutters for bank stabilization projects.

Env-Wt 307.14 (Rock Removal). All rocks that may be removed from Grant Brook will be blasted or removed unless necessary, and such rocks shall be used within 10-20 feet of their current location at a similar depth.

Env-Wt 307.15 (Use of Heavy Equipment in Wetlands) In order to construct the proposed project, heavy equipment will need to traverse the stream banks and enter Eastman Brook. Access causeways will be established with a temporary stone fill over geotextile fabric to minimize disruption of native soils and vegetation. Fills shall be limited to the wetland impact areas shown on the attached project plans. Temporary access routes will be restored to pre-construction condition at the conclusion of the proposed project.

Env-Wt 307.16 (Adherence to Approved Plans Required) All work shall be in accordance with the plans prepared by Hoyle, Tanner and approved by NHDES.

Env-Wt 307.17 (Unpermitted Activities). NA

Env-Wt 307.18 (Reports) The contractor will be responsible for preparing a Storm Water Pollution Prevention Plan. This plan will be submitted to NHDES for approval prior to the contractor working within jurisdictional resources.

Statement of whether the applicant has received comments from the local conservation commission and, if so, how the applicant has addressed the comments (Env-Wt 311.06(h))

A copy of this wetland permit application was submitted by the NHDOT to the Town of Woodstock for distribution to the Woodstock Conservation Commission concurrent with submittal of the application to NHDES.

Avoidance and Minimization of Impacts to Resource Functions and Values

Impacts to the Eastman Brook stream channel will be necessary to effectively stabilize the existing streambed and crossing structure as flow velocities at this location can reach 28 fps during a 100-year storm event (see attached Hydrologic and Hydraulic Analysis Summary). These projected flows would render vegetative, bio-engineering, and semi-natural form design impractical per Env-Wt 514.02(c). The proposed project includes installation of A-Jacks interlocking armor units to dissipate outlet stream energy and resist further scour and erosion in the streambed with rip-rap armoring proposed on the streambank. The proposed streambed strategy minimizes depth of impact to the streambed compared to riprap armoring and provides the opportunity to simulate a soft bank with native plantings above the normal base flow of the stream. Effective stabilization of this crossing will improve water quality in Eastman Brook by preventing downstream sedimentation caused by bank and bed erosion. Please see the completed Bank/Shoreline Stabilization Project Specific Worksheet included with this application package for the proposed project.

SRE completed a Function and Values Assessment as part of the attached Wetland Delineation Report, and the system exhibits the functions listed below. Avoidance and minimization of impact to each function has been addressed in the following ways:

- Flood-Flow Alteration (primary): Effective stabilization of this crossing will facilitate conveyance of flood-flows in Eastman Brook while protecting the bridge substructure and preventing downstream sedimentation caused by bank and bed erosion.
- Production Export: Vegetation clearing for construction access as proposed would have only a negligible and temporary impact on production export. Proposed permanent impacts are limited to currently eroded banks and the streambed of a fast-flowing upper perennial stream, which are unsuitable as habitat for most food-producing plant species.
- Fish Habitat: The proposed scour stabilization measures would be constructed with fine sediment filling the voids between stones to reduce vertical flow through armoring in the channel, perch water moving through the channel, and further ensure an aquatic means of passage for fish.
- Sediment/Shoreline Stabilization (primary): Floodplain wetland at the site functions to create a gradient between the streambed and upland and naturally stabilizes the bank. However, the high flows in the stream and the presence of the existing crossing undermine this natural system. The proposed solution would necessarily impact this gradient transition, but the areas of rip rap armoring have been minimized to cover only the streambank necessary to protect the substructure of the bridge, and the majority of these impacts are in locations already previously stabilized with riprap.
- Wildlife Habitat: Impacts to wildlife habitat in the shoreland area of Grant Brook would be temporary in nature, and shoreland construction access routes would be returned to pre-construction condition per the project's Shoreland Permit. Aquatic and semi-aquatic organisms, though potentially impacted by the change in substrate content, would benefit from the presence of a functioning low-flow channel.

Pre-application coordination with NHDES included attendance at the NHDOT Natural Resource Agency Meeting on April 15, 2020, a pre-application meeting June 18, 2020, and additional email coordination. Copies of meeting minutes and email coordination are included with this permit application. The proposed configuration

for scour stabilization was discussed and avoidance and minimization efforts were incorporated into the project design.

Mitigation

Compensatory Mitigation for the proposed project was discussed at a June 18, 2020 pre-application meeting with NHDES. All parties present agreed that all permanent impacts associated proposed in the streambed of Eastman Brook within the existing crossing are limited to stabilization for the purpose of protecting existing infrastructure; therefore, mitigation will not be required per Env-Wt 313.04(3)(a). It was also determined that because the streambed scour protection downstream of the crossing eliminates the perched outlet condition and restores connectivity, mitigation will not be required for this work and impacts either.

Armoring in impact areas C and E on the Wetland Impact Plan (attached) is proposed on previously disturbed bank. As a result, NHDES has concurred that these impacts will be considered temporary and will not be subject to Compensatory Mitigation.

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES
WETLAND PERMIT APPLICATION
for
Scour Stabilization of Bridge 203/079 – Interstate 93 over Eastman Brook
Woodstock, NH
Hydrologic and Hydraulic Analysis

The existing instream stone countermeasures of the 42-foot span double barrel (18' clear span each) concrete box culvert carrying I-93 over Eastman Brook in Woodstock, NH have failed and the stones have washed downstream of the crossing. Approximately 300-feet downstream of the crossing, significant bank erosion has occurred where the Eastman Brook's bend has been propagating toward a private landowner's property.

Hydrologic and hydraulic analyses were performed for the existing conditions for the Eastman Brook crossing at the I-93 Bridge. The hydrologic analysis was performed using USGS StreamStats for NH (USGS NH Regression Equations), which is the preferred method per the NHDOT Bridge Design Manual for ungagged sites. The 100-year storm event was used for design based on the estimated remaining life of the structure and the probability of exceedance for the storm event within that timeframe. This corresponds to a flow of 5,880 cubic feet per second.

The hydraulic analyses were performed using the Bureau of Reclamation's Sedimentation and River Hydraulics – Two-Dimensional model (SRH-2D), which is a 2D hydraulic, sediment, temperature, and vegetation model for river systems, utilizing Aquaveo surface-water modeling solution program, SMS 13.0, for the existing conditions. A two-dimensional analysis was completed because the waterway in the vicinity of the bridge is more complex and the brook is fairly large conveying water from a drainage area of 23.5 square miles. The existing plans, bridge inspection report, site photos, and publicly sourced LiDAR data were used to develop the hydraulic model of the crossing to obtain velocities and approximate water depths.

The maximum velocity in the channel for the 100-year storm event is 29.2 feet per second. Preliminary analysis using Design Guideline 14 in the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 23 (HEC-23), volume 2, showed that stone riprap with a minimum diameter of 6' would be necessary to adequately provide a static stream bottom to mitigate headcutting and undermining of the existing structure, as well as to further mitigate bend propagation downstream of the structure. This would be infeasible because the required stone size would necessitate an excavation depth of approximately 12'. The high velocity coupled with the observed scour at the outlet necessitates the installation of 48" A-Jacks to prevent scour. The A-Jacks revetment was designed to resist scour per Clopper, P.E. and M.S. Byars, 1999 publication. The A-Jacks are buried at the downstream end of the revetment to prevent contraction scour and headcutting.

Pre-Application Correspondence with NHDES

BUREAU OF ENVIRONMENT CONFERENCE REPORT

SUBJECT: NHDOT Monthly Natural Resource Agency Coordination Meeting

DATE OF CONFERENCE: April 15, 2020

LOCATION OF CONFERENCE: John O. Morton Building

ATTENDED BY:

NHDOT

Sarah Large
Ron Crickard
Andrew O'Sullivan
Meli Dube
Chris Carucci
Russ St. Pierre
Samantha Fifield
Anthony Weatherbee
Rebecca Martin
Jason Tremblay
David Scott
Marc Laurin
Phile Miles
Sandra Newman
Bill Saffian
Chelsey Noyes

ACOE

Rick Kristoff

EPA

Jeannie Brochi
Beth Alafat

**Federal Highway
Administration**

Jaimie Sikora

NHDES

Lori Sommer
Karl Benedict

NH Fish & Game

Carol Henderson

Natural Heritage Bureau

Amy Lamb

The Nature Conservancy

Pete Steckler

**Consultants/Public
Participants**

Peter Walker
Julie Whitmore
Kimberly Peace
Joanne Theriault
Sean James
Marge Badois

PRESENTATIONS/ PROJECTS REVIEWED THIS MONTH: *(minutes on subsequent pages)*

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(When viewing these minutes online, click on a project to zoom to the minutes for that project.)

This project in this context of mitigation land transfer has not been previously discussed at the Monthly Natural Resource Agency Coordination Meeting.

Statewide, #41915 (X-A004(799))

The NH Department of Transportation (NHDOT) Statewide #41915 Project involves stabilization efforts at seven locations in Grafton County to address scour issues and prevent additional scouring or undermining of the existing crossings, and, where feasible, increase aquatic organism passage and stabilize bank and streambed areas through the crossing. The seven locations include: NH Route 118 over Bucks Brook in Dorchester; River Road over the South Branch Baker River in Dorchester; Millbrook Road over Mill Brook located in Landaff; NH Route 10 over Grant Brook located in Lyme; NH Route 25 over Halls Brook in Rumney; NH Route 175 over Mill Brook in Thornton; and Interstate 93 over Eastman Brook in Woodstock. Kimberly Peace, Sean James, and Joanne Theriault from Hoyle Tanner presented.

J. Theriault gave an overview of the project goals and then reviewed each bridge individually. In each location, scour stabilization measures will be installed to protect the existing infrastructure. Work will not be conducted on the bridge, wingwalls or abutments. Plans provided show approximate impact areas and locations of construction access routes. Survey/topo shown on plans has been created using LIDAR along with limited ground survey in some locations. In all locations, unless stated otherwise, the intent is to excavate the streambed to the required depth, install riprap to match existing elevations and key into the upstream and downstream profiles. Impacts to Northern long-eared bat summer habitat will need to be addressed at all locations, and Essential Fish Habitat (EFH) analysis for Atlantic salmon will need to be addressed at all but one location (Lyme 075/106). A Categorical Exclusion for the project is being developed that will address these issues, along with some potential Section 6(f) concerns in Dorchester and Section 106 and 4(f) concerns in Lyme. Each location will undergo state environmental permitting separately, and all locations are Tier 3 stream crossings with watersheds greater than or equal to 640 acres per Env-Wt 904.05.

NH Route 118 over Bucks Brook in Dorchester

Proposed installation of Class V stone on outlet side only for approximately 1,300 sq ft of streambed and bank impact. S. James noted that the streambed will be excavated approximately 3' deep so that the stone will be installed at existing grade, over a geotextile layer, with no change in streambed profile.

L. Sommer: Is the culvert perched? S. James: No.

R. Crickard: The plans for the next meeting should indicate more precise locations of riprap installation. Hoyle, Tanner agreed.

L. Sommer: The linear feet of channel impact would be used to calculate mitigation, and are you proposing to cover the bank areas with native or original streambed material?

K. Benedict: DES requests covering riprap to fill the voids, using existing stone where possible, and presenting a good alternatives analysis. The result should be a stream simulation that matches upstream and downstream conditions where possible, but if the hydrology of the stream would result in loose materials washing downstream, maybe just fill the voids. The end result should be a stabilized base to sit below the streambed simulation materials.

S. James: In this location, there is high enough velocity that the native material would wash downstream. Hoyle, Tanner agrees to look into filling the riprap voids.

K. Benedict: Look at the wetlands rules Env-Wt 514 to address the requirements for bank stabilization, specifically how high up the banks the riprap should be. Can some portion of the bank be left vegetated? How will impacts be minimized? The permit application will need to include analysis of stream velocities and flood elevations.

C. Henderson: What about the NHNHB Datacheck results?

J. Theriault: There are no species identified in this location, and per prior discussion with K. Benedict, plans with impacts identified will be sent to NHF&G for their review prior to permit submittal.

River Road over the South Branch Baker River in Dorchester

Proposed installation of Class IX stone on outlet and inlet sides for approximately 6,550 sq ft of streambed and bank impact. S. James noted that the streambed will be excavated approximately 6' deep so that the stone will be installed at existing grade, over a geotextile layer, with no change in streambed profile. The northwest bank will contain some armoring to provide stability where it currently erodes.

K. Benedict: Similar concerns as prior crossing. Additionally, has there been thought of deflecting the energy using design instead of bank armoring?

S. James: Those options can be examined.

K. Benedict: Will the stream be crossed with equipment to work on the opposite bank, or will there be a second access on the west side?

S. James: The site has limited access options, so work will occur on the opposite (west) side from the access road while the stream is diverted on that side. The diversion and stream flow will then reverse, and work will occur on the east side closer to the access road.

Millbrook Road over Mill Brook located in Landaff

Proposed installation of Class VII stone on outlet side only for approximately 1,250 sq ft of streambed and bank impact along with repairs to the stone masonry wall on the northeast side. S. James noted that the streambed will be excavated approximately 4' deep so that the stone will be installed at existing grade, over a geotextile layer, with no change in streambed profile.

K. Benedict: Same concerns as prior crossings.

NH Route 10 over Grant Brook located in Lyme

Proposed installation of Class V stone on the outlet and inlet sides for approximately 3,500 sq ft of streambed and bank impact. S. James noted that the streambed will be excavated approximately 3' deep so that the stone will be installed at existing grade, over a geotextile layer, with no change in streambed profile. The stream has aggraded in the southeast side through the crossing.

A. O'Sullivan: Will the aggraded material be removed?

S. James: It isn't planned to be removed since the stream through the crossing is in a steady-state, the aggradation has been stabilized, and the focus is on protection of the infrastructure.

K. Benedict: Current and energy deflection could also be examined in this location to direct energy back to the center of the channel.

C. Henderson: NHF&G would like to examine this more closely as it relates to fish passage.

NH Route 25 over Halls Brook in Rumney

Proposed installation of stone on the outlet for approximately 4,500 sq ft of streambed and bank impact along with grout filled nylon bags at the wingwalls where they have been undermined. S. James noted that the depth and type of stone is still being investigated and will be based on final survey data to address the scour hole and perched outlet.

C. Henderson: How will the perched outlet be addressed?

S. James: Stone will be added to fill the scour hole and regrade the streambed so that it will key into the downstream elevation. In this location the streambed will not be excavated unless it is determined during final survey.

K. Benedict: Consider using a grade control structure.

S. James: The issue with grade control is that we encounter resistance during permitting due to reduction in aquatic organism passage. If DES could provide suggestions that could satisfy NHF&G we would review them for potential use in this location.

K. Benedict agreed and said the new crossing should be an improvement for fish passage.

J. Theriault: This location has wood turtle habitat nearby but just outside of the proposed work areas. Once impacts have been determined, coordination with NHF&G will occur to determine avoidance and minimization measures.

NH Route 175 over Mill Brook in Thornton

Proposed installation of Class VII stone on the outlet and inlet sides for approximately 5,650 sq ft of streambed and bank impact. This location will have two access routes. S. James noted that the streambed will be excavated approximately 4' deep so that the stone will be installed at existing grade, over a geotextile layer, with no change in streambed profile.

P. Steckler: What is the pond upstream and north of the site? Is it connected to the stream crossing?

S. James: We are aware of this water feature but are not sure whether it is natural or manmade. The water feature / pond is outside of the proposed work areas, but Hoyle, Tanner will review the mapping of the area to determine any potential connection between the pond and the river.

NH Route 175 over the Pemigewasset River in Woodstock

Proposed installation of A Jacks or an armor matrix on the outlet side within the streambed and Class IX stone to be placed on the banks for approximately 7,100 sq ft of streambed and bank impact. There is steel sheeting in the river on the downstream side that will be removed in order to install the armor matrix.

K. Benedict: DES will want to review the specs of the armor matrix.

S. Large: DOT has proposed and permitted this product and understands DES will require cross-section profiles as part of the permit for review. The impacts will be shown as permanent for the wetland permits. Adding native material or infill may not be feasible due to the high water velocity here. Hydraulic analysis will be provided with the application.

A. Lamb: Due to the way this project was drawn on the DataCheck tool, it just missed a “hit” for Northern Long-Eared Bat Hibernaculum. This record is just over 0.6 mile from impact areas.

Project Summary Discussion

S. Large: Crossing designs will need to be reviewed for consistency with the wetland rules regarding bank stabilization.

K. Benedict: In general, each permit application will need to address avoidance and minimization, alternative designs, stream simulations and materials, and plans will need to show cross-sections, erosion controls and water diversion. It would be helpful for the next meeting to have the limits of existing riprap shown. For the crossings that are perched, presentation should include longitudinal profiles. Consider adding a low flow channel through the center of the stream simulation to allow for continual hydraulic connectivity.

P. Steckler agreed with the need to design low flow channels into these projects.

K. Benedict: Information should also be provided to quantify linear feet of impacts between stream bed and banks, and DOT should consider and plan for timing of work to minimize impacts to fish populations.

S. Large: A meeting should be held between K. Benedict and DOT before the next NR Meeting.

S. James: Requested clarification on the amount of detail for water diversion, since contractor means and methods allow the to modify what we propose. K. Benedict stated that DES can condition the permit for the contractor to provide a final dewatering plan with DES given 2 weeks to review it before start of construction, and that his review is to ensure the impacts from dewatering are contained in the permit and that the dewatering plan is feasible.

There were no other concerns stated by the meeting attendees.

It was decided that a second NR Meeting should be held before submitting permit applications.

This project has not been previously discussed at a Monthly Natural Resource Agency Coordination Meeting.

MEETING NOTES



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PROJECT: Bridge Scour Stabilization
Lyme Bridge No. 075/106
Woodstock Bridge No. 203/079
Federal Project No.: X-A004(779)
NHDOT Project No. 41915

**DATE OF
CONFERENCE:** June 18, 2020

DATE ISSUED: June 29, 2020

LOCATION: Microsoft Teams Online Meeting

ATTENDEES: Karl Benedict, NHDES
Lori Sommer, NHDES
Sarah Large, NHDOT
Kimberly Peace, Hoyle, Tanner
Joanne Theriault, Hoyle, Tanner
Sean James, Hoyle, Tanner

SUBJECT: Pre-Application Meeting and Mitigation Coordination

PREPARED BY: J. Theriault
Hoyle, Tanner Project No. 092592.01 and 092590.18

Distribution: All attendees

The NH Department of Transportation (NHDOT) Statewide #41915 Project involves stabilization efforts at seven locations in Grafton County to address scour issues and prevent additional scouring or undermining of the existing crossings, and, where feasible, increase aquatic organism passage (AOP) and stabilize bank and streambed areas through the crossing. NHDOT and Hoyle, Tanner & Associates, Inc. (Hoyle, Tanner) are currently preparing the following wetland permit applications:

- Lyme Bridge No. 075/106 – NH Route 10 over Grant Brook
- Woodstock Bridge No. 203/079 – Interstate 93 over Eastman Brook

K. Peace refamiliarized meeting attendants with the scope of the project and introduced the two current proposed project locations.

Lyme Bridge No. 075/106

K. Peace summarized the proposed streambank and streambed stabilization proposal and current challenges at the site.

K. Benedict started discussion with proposed bank stabilization upstream of the crossing. He stated concerns about using riprap and requested confirmation that this strategy would fulfill the project-specific

requirements for Bank Stabilization in Section 500 of the NH Wetland Administrative Rules. Would vegetated banks be a viable solution?

K. Peace responded that at 16.2 FPS in the design storm, flow would wash away any soft bank stabilization solution. The slope is also quite steep, as shown on the plan contours, creating a difficult space for a vegetated bank.

L. Sommer asked for a description of the current bank condition. K. Peace provided a copy of the Stoney Ridge Environmental Wetland Delineation Report to show photos of the bank.

S. James explained that the scour problem at the site stems from the hard turn the stream takes prior to entering the inlet of the crossing. He discussed minimization efforts that have been incorporated into the current design. K. Peace then added that the proposed armoring would redirect flow energy from the degraded bank.

L. Sommer asked if the addition of loam on top of the riprap armoring would be possible to vegetate the bank, and K. Benedict added that native planting rather than seed would be ideal.

S. James answered that loam and vegetation would likely remain in place above the level of the 100-year storm, but when he double checked the elevations, he realized that would only leave a 4-5' strip of vegetation along the top of a riprap bank.

K. Benedict examined plan contours and voiced concern about the delineated top-of-bank and asked that it be re-evaluated. Perhaps the top-of-bank should be at the top of the slope shown by the contours.

K. Peace and S. Large indicated that the banks were delineated by a reputable Certified Wetland Scientist (CWS), and K. Peace added that the plan contours were based on LIDAR rather than site-specific survey and referred to photos from the delineation report to support location of delineated top-of-bank. S. Large stated the CWS will be contacted to evaluate the TOB question and confirm the lines shown on the plans correctly convey the jurisdictional resources. **after this meeting, S. Large and K. Peace met with Cindy Balcius to discuss the delineation. Additional information and narrative about the resources is included within the supplemental narrative of the application to describe the river and changes in characteristics Stoney Ridge Environmental delineated in the field.*

K. Benedict expressed uncertainty about whether the proposed bank stabilization would be directly related to protecting the bridge infrastructure.

S. Large conceded that the bank stabilization in areas where riprap was not previously placed may not qualify for self-mitigation since the recommended self-mitigating efforts of vegetating the banks to soft armor them would not likely be a sustainable design practice and therefore NHDOT would proceed with the one time In-Lieu Fee payment for the impacts from this section of the proposed project.

K. Peace added that although protection of infrastructure traditionally is proposed right near bridge footings, this proposed work would be preventing expansion of the existing scour hole and eventual undermining of the bridge infrastructure. This goal of the project is to extend the life of the existing structure. If the scour hole was not repaired, the bank would need to be stabilized with riprap along the entire length from the edge of the scour hole to the abutment, which would not address minimization of impacts.

L. Sommer asked what the life extension goal is for the project.

S. James responded that the existing bridge is in good shape, and the proposed scour solution should protect it for 10-20 years.

L. Sommer proposed the idea of post-construction monitoring to observe any downstream problems resulting from energy deflection by armored bank.

S. Large responded that bridge condition and scour monitoring is routinely performed by NHDOT, but if the project were conditioned requiring specific monitoring and associated reporting, funding would be needed. Funding for this would be unavailable through this project if also paying an In-Lieu Fee.

K. Benedict emphasized that narrative language will be needed to justify use of riprap armoring for bank stabilization, directed applicants to the bank stabilization guidance provided to NHDES, and suggested that deflection of the flow toward the center of the channel would be a potential solution.

K. Benedict then asked about streambed impacts for the proposed project and requested confirmation that riprap was proposed below the ordinary high-water mark.

K. Peace confirmed that riprap is proposed in the streambed.

S. Large added that stabilization measures are proposed throughout the channel and referred to cross-sections shown in the draft project plans. These figures show proposed grading in order to create a low-flow channel to accommodate AOP that was added at the request of NHDES at the NHDOT Natural Resource Agency Meeting.

S. James added that the flows at the crossing have already degraded the streambed at the crossing. Design considerations at the crossing included keeping the armoring as thin as possible to prevent excavating below the level of the existing footings.

K. Benedict asked for confirmation that the Item Spec. for the streambed would be riprap. L. Sommer followed up by asking if this would match the existing streambed composition.

S. Large stated that simulated streambed material matching the existing streambed composition would be lost in high flows and S. James confirmed this.

L. Sommer and K. Benedict asked about fisheries and AOP. In designing for high-flow storms, are we eliminating passage during all low flows?

S. Large responded by describing contouring for low-flow passage proposed in the streambed and confirming that the streambed material would be constructed so that flow would remain on top of the material by compacting and filling in voids by mixing in smaller material and/or washing in fines to prevent vertical flow to maintain the low-flow channel.

K. Benedict agreed with this strategy and requested that the project narrative and construction sequencing reflect this.

S. Large summarized mitigation strategy for the Lyme Crossing. If NHDOT is paying a mitigation fee for permanent streambed impacts, no funding will be available for monitoring.

The meeting attendants agreed that bank impacts (represented in areas A, C, E, G, and H on the project plans) will be subject to mitigation and NHDOT will pay in In-Lieu Fee. Bed impacts will not require mitigation, and the Department anticipates a permit condition requiring post-construction monitoring, and NHDOT will be responsible for addressing any deficiencies in the low-flow channel. L. Sommer asked that the mitigation narrative for the application include the ARM calculator equivalent for permanent stream channel impacts and that if post construction the stream functions were lost due to deficiencies in the installation of material within the stream channel that NHDOT either address the deficiencies or pay the ARM equivalent.

K. Benedict asked how stream diversion will be done at the site. S. Large, supported by S. James, responded that a center sandbag diversion is proposed. K. Benedict agreed that this would work as long as the contractor is cautious about high flow events while diversion is in place.

Woodstock Bridge 203/079

K. Peace described the site existing condition, including describing the previous stabilization work done at the crossing. She advocated for the proposed addition of A-Jacks at the outlet stating that the river flows reach 29.2 FPS. Previously added stone in the streambed has washed away in high-flow events.

S. Large added that there is evidence of existing riprap at the inlet, and she suggested that these areas may not be subject to mitigation as they are previously disturbed. She asked if these areas would be called out in project plans.

S. James pointed out that the temporary inlet impacts are shown for water diversion purposes. A longitudinal cross-section will be placed on the final page of the plan set to show AOP. K. Peace added that Hoyle, Tanner will look into addressing the extent of previous work on the plan set in the permit application.

K. Benedict asked about how water diversion would be handled at this site.

S. James responded that water would be diverted with sandbag cofferdams coming in from the north. South work would be done first, and the cofferdams would divert water into one barrel at a time.

K. Peace supported the proposed A-Jacks treatment by adding that A-Jacks minimize depth of impacts compared to riprap. This support will be provided in narrative form in the wetland permit application

K. Benedict agreed that this narrative language was appropriate and added that coordination with NHF&G coordination should also be included to support the adequacy of fish passage measures at this location.

L. Sommer asked about the proposed work on the bank at the outlet.

S. James responded that rip rap is proposed on the bank above the A-Jacks.

S. Large pointed out that there is existing riprap in those locations. She proposed there would be no mitigation necessary in impact areas C and E shown on the plans, and impact area D would be considered self-mitigating.

L. Sommers agreed that no in-lieu fee would be required for this site.

K. Peace summarized and closed the discussion by confirming that both Lyme and Woodstock sites would be major impact bank and streambed stabilization projects; Env-Wt 900 will not be addressed since these are not stream crossing projects. Wetland permit applications will show all existing riprap on plans and include this as justification of the lack of mitigation in those locations.

Should you have any questions regarding the above, please contact Kimberly Peace at kpeace@hoyletanner.com

Submitted by:

A handwritten signature in black ink that reads "Kimberly Peace". The signature is written in a cursive, flowing style.

Kimberly Peace
Senior Environmental Coordinator
Hoyle, Tanner & Associates, Inc.
cc: Attendees, File



**US Army Corps
of Engineers®**
New England District

**New Hampshire General Permits (GPs)
Appendix B - Corps Secondary Impacts Checklist
(for inland wetland/waterway fill projects in New Hampshire)**

1. Attach any explanations to this checklist. Lack of information could delay a Corps permit determination.
2. All references to “work” include all work associated with the project construction and operation. Work includes filling, clearing, flooding, draining, excavation, dozing, stumping, etc.
3. See GC 5, regarding single and complete projects.
4. Contact the Corps at (978) 318-8832 with any questions.

1. Impaired Waters	Yes	No
1.1 Will any work occur within 1 mile upstream in the watershed of an impaired water? See http://des.nh.gov/organization/divisions/water/wmb/section401/impaired_waters.htm to determine if there is an impaired water in the vicinity of your work area.*		X
2. Wetlands	Yes	No
2.1 Are there are streams, brooks, rivers, ponds, or lakes within 200 feet of any proposed work?	X	
2.2 Are there proposed impacts to SAS, special wetlands. Applicants may obtain information from the NH Department of Resources and Economic Development Natural Heritage Bureau (NHB) DataCheck Tool for information about resources located on the property at https://www2.des.state.nh.us/nhb_datacheck/ . The book Natural Community Systems of New Hampshire also contains specific information about the natural communities found in NH.		X
2.3 If wetland crossings are proposed, are they adequately designed to maintain hydrology, sediment transport & wildlife passage?	N/A	
2.4 Would the project remove part or all of a riparian buffer? (Riparian buffers are lands adjacent to streams where vegetation is strongly influenced by the presence of water. They are often thin lines of vegetation containing native grasses, flowers, shrubs and/or trees that line the stream banks. They are also called vegetated buffer zones.)	X	
2.5 The overall project site is more than 40 acres?		X
2.6 What is the area of the previously filled wetlands?	N/A	
2.7 What is the area of the proposed fill in wetlands?	4,265 SF	
2.8 What is the % of previously and proposed fill in wetlands to the overall project site?	N/A	
3. Wildlife	Yes	No
3.1 Has the NHB & USFWS determined that there are known occurrences of rare species, exemplary natural communities, Federal and State threatened and endangered species and habitat, in the vicinity of the proposed project? (All projects require an NHB ID number & a USFWS IPAC determination.) NHB DataCheck Tool: https://www2.des.state.nh.us/nhb_datacheck/ USFWS IPAC website: https://ecos.fws.gov/ipac/location/index	X	

3.2 Would work occur in any area identified as either “Highest Ranked Habitat in N.H.” or “Highest Ranked Habitat in Ecological Region”? (These areas are colored magenta and green, respectively, on NH Fish and Game’s map, “2010 Highest Ranked Wildlife Habitat by Ecological Condition.”) Map information can be found at: <ul style="list-style-type: none"> • PDF: www.wildlife.state.nh.us/Wildlife/Wildlife_Plan/highest_ranking_habitat.htm. • Data Mapper: www.granit.unh.edu. • GIS: www.granit.unh.edu/data/downloadfreedata/category/databycategory.html. 		X
3.3 Would the project impact more than 20 acres of an undeveloped land block (upland, wetland/waterway) on the entire project site and/or on an adjoining property(s)?		X
3.4 Does the project propose more than a 10-lot residential subdivision, or a commercial or industrial development?		X
3.5 Are stream crossings designed in accordance with the GC 21?	N/A	
4. Flooding/Floodplain Values	Yes	No
4.1 Is the proposed project within the 100-year floodplain of an adjacent river or stream?	X	
4.2 If 4.1 is yes, will compensatory flood storage be provided if the project results in a loss of flood storage?	N/A	
5. Historic/Archaeological Resources		
For a minimum, minor or major impact project - a copy of the Request for Project Review (RPR) Form (www.nh.gov/nhdhr/review) with your DES file number shall be sent to the NH Division of Historical Resources as required on Page 11 GC 8(d) of the GP document**	X	

*Although this checklist utilizes state information, its submittal to the Corps is a Federal requirement.

** If your project is not within Federal jurisdiction, coordination with NH DHR is not required under Federal law.

**U.S. Army Corps of Engineers
New Hampshire Programmatic General Permit (PGP)
Appendix B Corps Secondary Impacts Checklist
(for inland wetland/waterway fill projects in New Hampshire)**

**Scour Stabilization of Bridge 203/079 – Interstate 93 over Eastman Brook
Woodstock, NH**

Explanations for Checklist Answers

- 2.1 The project is proposed to stabilize areas of scour and structure deterioration at an existing stream crossing. The stream and some associated floodplain will be affected by the project.
- 2.4 Riparian buffers will be affected by the project as required to gain construction access to the existing bridge; however, these impacts have been minimized to the extent practicable. Impact areas will be restored upon completion of construction.
- 3.1 The NH Natural Heritage Bureau was contacted regarding the proposed project (see attached letter NHB20-1199, dated 04/29/2020). The database check determined that there are no recorded occurrences for sensitive species near the project area.

An official Federally-listed species list was obtained from the US Fish and Wildlife Service (USFWS) using the Information for Planning and Conservation (IPAC) online tool on May 4, 2020 (Consultation Code 05E1NE00-2019-SLI-2792). The list includes the Federally-threatened Northern Long Eared Bat (*Myotis septentrionalis*; NLEB).

The proposed work would be consistent with the scope of actions included in the FHWA, Federal Rail Associated and Federal Transit Authority Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and NLEB revised on February 5, 2018. The online determination key through IPAC was used to determine that this project may and is likely to adversely affect NLEB due to the necessity of 11,450 square feet of tree clearing for construction access during the NLEB active season. USFWS concurred with this finding in a letter dated 6/11/2020.

- 4.1 The proposed scour stabilization project is located within the 100-year floodplain of Eastman Brook but will not result in a loss of flood storage. The proposed project includes installation of A-Jacks and rip-rap armor to resist further scour and erosion on the streambank and in the streambed. Effective stabilization of this crossing will improve Eastman Brook's ability to handle runoff waters by preventing downstream sedimentation caused by bank and bed erosion. The riprap installation has been designed to match existing upstream and downstream elevations such that the primary stream functions through the crossing will not change.
- 5. A Request for Project Review was submitted in May 2020 to the New Hampshire Division of Historic Resources (NHDHR) for the entire NHDOT 41915 Scour Stabilization Project. A response was received acknowledging the presence of three historic properties in the combined Area of Potential Effects (APE) of the project but requesting no additional inventory. NHDHR had additional concerns regarding areas of archaeological sensitivity along proposed construction access routes but determined that there would be no adverse effects to subterranean resources provided that clearing of vegetation is limited to ground level and no tree stumping and excavation occurs whenever possible. A determination of No Adverse Effect was completed on July 7, 2020, and is attached.

Natural Heritage Bureau (NHB) Review



New Hampshire Natural Heritage Bureau

To: Joanne Theriault
Hoyle, Tanner & Associates, Inc.
150 Dow Street
Manchester, NH 03101

Date: 4/29/2020

From: NH Natural Heritage Bureau

Re: Review by NH Natural Heritage Bureau of request dated 4/29/2020
NHB File ID: NHB20-1199

Applicant: NHDOT

Location: Tax Map(s)/Lot(s):
Woodstock

Project Description: Scour Protection of Bridge No. 203/179 Interstate 93 over
Eastman Brook. Previously reviewed as NHB19-1202.

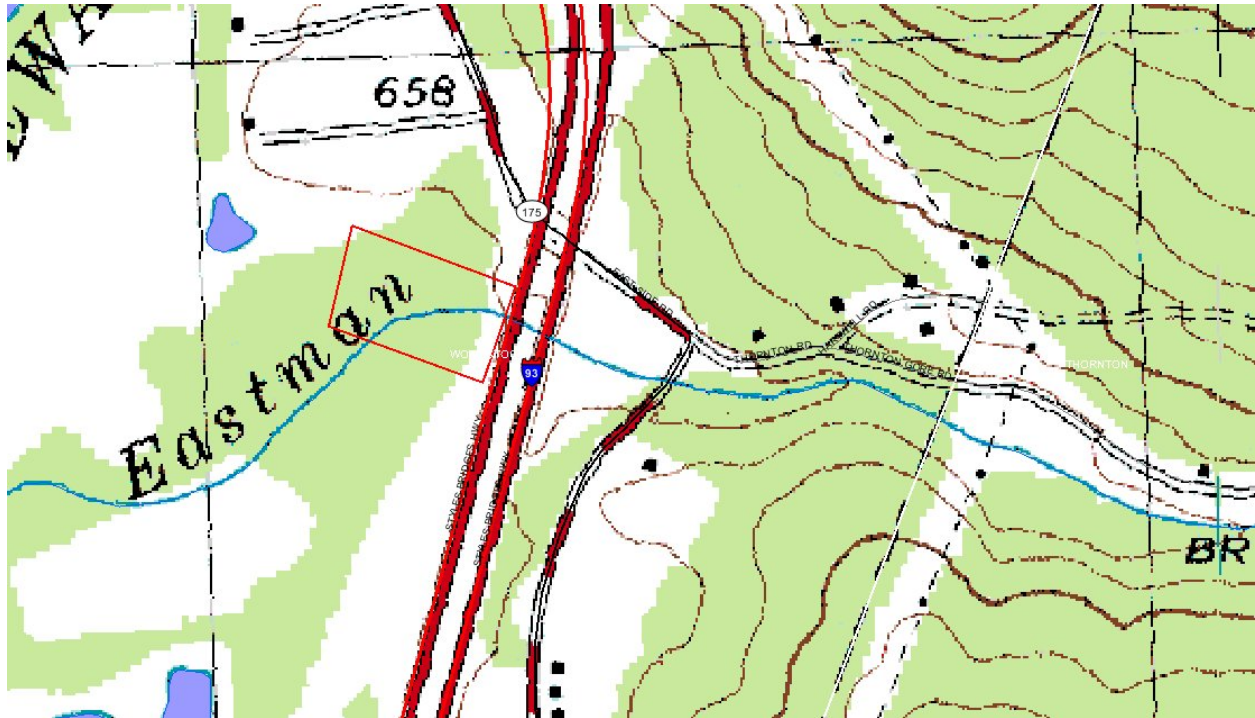
The NH Natural Heritage database has been checked for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government. We currently have no recorded occurrences for sensitive species near this project area.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

This report is valid through 4/28/2021.



MAP OF PROJECT BOUNDARIES FOR NHB FILE ID: NHB20-1199



US Fish and Wildlife (USF&W) IPaC Results & Verification Letter

Theriault, Joanne E.

From: Lamb, Amy <Amy.Lamb@dncr.nh.gov>
Sent: Friday, September 13, 2019 9:56 AM
To: Theriault, Joanne E.
Subject: RE: Verification on NHB19-1202, NHB19-1203

Hi Joanne,

Thanks for checking about the potential for Northern Long-Eared bats records in the vicinity of these projects. NHB19-1202 is not within 0.5 or 0.25 miles of a NLEB hibernaculum. NHB19-1203 is also no within 0.5 or 0.25 miles of a hibernaculum, but it is just over 0.6 miles away. Since that is close to the cutoff, I wanted to let you know. I do recall that FHWA-funded projects may have additional requirements for NLEB, so I wanted you to have that information just in case.

Let me know if you have any questions,
Amy

Amy Lamb
Ecological Information Specialist
(603) 271-2834
amy.lamb@dncr.nh.gov

NH Natural Heritage Bureau
DNCR - Forests & Lands
172 Pembroke Rd
Concord, NH 03301

From: Theriault, Joanne E. <jtheriault@hoyletanner.com>
Sent: Thursday, September 05, 2019 2:47 PM
To: Lamb, Amy <Amy.Lamb@dncr.nh.gov>
Cc: 092592.01 - NHDOT Statewide Env #41768 Scour Stabilization <092592.01-NHDOTStatewideEnv#41768ScourStabilization@hoyletanner.onmicrosoft.com>; Peace, Kimberly R. <kpeace@hoyletanner.com>
Subject: Verification on NHB19-1202, NHB19-1203

EXTERNAL: Do not open attachments or click on links unless you recognize and trust the sender.

Hi Amy,
I'm wondering if you might be able to ease my mind by double-checking something. Deb Coon from my department did eight data checks back in April for bridge locations where NHDOT is proposing some scour stabilization. We received automated negative results for two of the bridge sites in Woodstock, but I want to make sure we're not within ¼ or ½ mile of a known northern long eared bat hibernaculum, since this has come up before in Woodstock. When you have a second, would you mind letting me know?
NHB19-1202
NHB19-1203

I totally understand if you need the fee for this request since we didn't pay for these file numbers before, and I can get some checks printed if necessary.

Thank you so much,
-Joanne

Joanne E. Theriault
Environmental Coordinator



Responsive. Consistent. Competent.™

150 Dow Street | Manchester, NH 03101
(603) 669-5555, ext 160 | Fax: (603) 669-4168



United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
<http://www.fws.gov/newengland>



In Reply Refer To:

May 04, 2020

Consultation Code: 05E1NE00-2019-SLI-2792

Event Code: 05E1NE00-2020-E-07127

Project Name: NHDOT No. 41915 Scour Stabilization Project

Subject: Updated list of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office

70 Commercial Street, Suite 300

Concord, NH 03301-5094

(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2019-SLI-2792

Event Code: 05E1NE00-2020-E-07127

Project Name: NHDOT No. 41915 Scour Stabilization Project

Project Type: TRANSPORTATION

Project Description: The NH Department of Transportation (NHDOT) Statewide #41915 Project involves stabilization efforts at seven locations to address scour issues and prevent additional scouring or undermining of the existing crossing, and, where feasible, increase aquatic organism passage through the crossing.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/43.969417121098886N71.67522950893765W>



Counties: Grafton, NH

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.



United States Department of the Interior

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Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
<http://www.fws.gov/newengland>



IPaC Record Locator: 749-21560992

May 05, 2020

Subject: Consistency letter for the 'NHDOT No. 41915 Scour Stabilization Project' project (TAILS 05E1NE00-2019-R-2792) under the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat.

To whom it may concern:

The U.S. Fish and Wildlife Service (Service) has received your request to verify that the **NHDOT No. 41915 Scour Stabilization Project** (Proposed Action) may rely on the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (PBO) to satisfy requirements under Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 *et seq.*).

Based on the information you provided (Project Description shown below), you have determined that the Proposed Action is within the scope and adheres to the criteria of the PBO, including the adoption of applicable avoidance and minimization measures, and may affect, and is likely to adversely affect the endangered Indiana bat (*Myotis sodalis*) and/or the threatened Northern long-eared bat (*Myotis septentrionalis*). Consultation with the Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) is required.

This "may affect - likely to adversely affect" determination becomes effective when the lead Federal action agency or designated non-federal representative requests the Service rely on the PBO to satisfy the agency's consultation requirements for this project. Please provide this consistency letter to the lead Federal action agency or its designated non-federal representative for review, and as the agency deems appropriate, transmit to this Service Office for verification that the project is consistent with the PBO.

This Service Office will respond by letter to the requesting Federal action agency or designated non-federal representative within 30 calendar days to:

- verify that the Proposed Action is consistent with the scope of actions covered under the PBO;
- verify that all applicable avoidance, minimization, and compensation measures are included in the action proposal;
- identify any action-specific monitoring and reporting requirements, consistent with the monitoring and reporting requirements of the PBO, and
- identify anticipated incidental take.

ESA Section 7 compliance for this Proposed Action is not complete until the Federal action agency or its designated non-federal representative receives a verification letter from the Service.

For Proposed Actions that include bridge/structure removal, replacement, and/or maintenance activities: If your initial bridge/structure assessments failed to detect Indiana bats, but you later detect bats during construction, please submit the Post Assessment Discovery of Bats at Bridge/Structure Form (User Guide Appendix E) to this Service Office. In these instances, potential incidental take of Indiana bats may be exempted provided that the take is reported to the Service.

If the Proposed Action may affect any other federally-listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Office is required. If the proposed action has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency accordingly.

Project Description

The following project name and description was collected in IPaC as part of the endangered species review process.

Name

NHDOT No. 41915 Scour Stabilization Project

Description

The NH Department of Transportation (NHDOT) Statewide #41915 Project involves stabilization efforts at seven locations to address scour issues and prevent additional scouring or undermining of the existing crossing, and, where feasible, increase aquatic organism passage through the crossing.

Determination Key Description: FHWA, FRA, FTA Programmatic Consultation For Transportation Projects Affecting NLEB Or Indiana Bat

This key was last updated in IPaC on December 02, 2019. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) for the endangered **Indiana bat** (*Myotis sodalis*) and the threatened **Northern long-eared bat** (NLEB) (*Myotis septentrionalis*).

This decision key should only be used to verify project applicability with the Service's [February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects](#). The programmatic biological opinion covers limited transportation activities that may affect either bat species, and addresses situations that are both likely and not likely to adversely affect either bat species. This decision key will assist in identifying the effect of a specific project/activity and applicability of the programmatic consultation. The programmatic biological opinion is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic biological opinion, or that may affect ESA-listed species other than the Indiana bat or NLEB, or any designated critical habitat, may require additional ESA Section 7 consultation.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087
<http://www.fws.gov/newengland>



June 11, 2020

Ronald Crickard
Bureau of Environment
NH Department of Transportation
7 Hazen Drive, P.O. Box 483
Concord, New Hampshire 03302-0483

Re: NH DOT Project 41915, Scour Stabilization Project, NH
TAILS: 05E1NE00-2019-F-2792

Dear Mr. Crickard:

The U.S. Fish and Wildlife Service (Service) is responding to your request, dated May 7, 2020, to verify that the New Hampshire Department of Transportation (NHDOT) Project 41915 (Project), the proposed stabilization activities at seven bridge locations in the towns of Dorchester, Landaff, Lyme, Rumney, Thornton, and Woodstock, New Hampshire, may rely on the December 15, 2016, Programmatic Biological Opinion (BO) for federally funded or approved transportation projects that may affect the northern long-eared bat (*Myotis septentrionalis*) (NLEB). We received your request and the associated LAA Consistency Letter on May 7, 2020. This letter provides the Service's response as to whether the Federal Highway Administration may rely on the BO to comply with section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; U.S.C. 1531 *et seq.*) for the Project's effects to the NLEB.

The NHDOT, as the non-Federal agency representative for the Federal Transportation Agency, has determined that the Project may affect, and is likely to adversely affect the NLEB. The Project consists of stabilization activities that will address scouring and undermining issues at existing stream crossings. All project tree clearing will occur within 300 feet of the road surface. Less than 1 acre in total of tree clearing will occur, which may be implemented during the bat active season.

NHDOT also determined the Project may rely on the programmatic BO to comply with section 7(a)(2) of the ESA, because the Project meets the conditions outlined in the BO and all tree clearing related to the proposed work will occur farther than 0.25 mile from documented roosts and farther than 0.5 mile from any known hibernacula. The Service reviewed the LAA Consistency Letter and concurs with NHDOT's determination. This concurrence concludes your ESA section 7 responsibilities relative to this species for this Project, subject to the Reinitiation Notice below.

Conclusion

The Service has reviewed the effects of the proposed Project, which include the NHDOT's commitment to implement the impact avoidance, minimization, and compensation measures as indicated on the LAA Consistency Letter. We confirm that the proposed Project's effects are consistent with those analyzed in the BO. The Service has determined that the Project is consistent with the BO's conservation measures, and the scope of the program analyzed in the BO is not likely to jeopardize the continued existence of the NLEB. In coordination with your agency, the Federal Highway Administration, and the other sponsoring Federal Transportation Agencies, the Service will reevaluate this conclusion annually in light of any new pertinent information under the adaptive management provisions of the BO.

Incidental Take of the Northern Long-eared Bat

The Service anticipates that tree removal associated with the proposed Project will cause incidental take of the NLEB. However, the Project is consistent with the BO, and such projects will not cause take of NLEBs that is prohibited under the final 4(d) rule for this species (50 CFR §17.40(o)). Therefore, this taking does not require exemption from the Service.

Reporting Dead or Injured Bats

The NHDOT, the Federal Highway Administration, its State/local cooperators, and any contractors must take care when handling dead or injured NLEBs that are found at the project site, in order to preserve biological material in the best possible condition and to protect the handler from exposure to diseases, such as rabies. Project personnel are responsible for ensuring that any evidence about determining the cause of death or injury is not unnecessarily disturbed. Reporting the discovery of dead or injured listed species is required in all cases to enable the Service to determine whether the level of incidental take exempted by this BO is exceeded, and to ensure that the terms and conditions are appropriate and effective. Parties finding a dead, injured, or sick specimen of any endangered or threatened species must promptly notify the Service's New England Field Office.

Reinitiation Notice

This letter concludes consultation for the proposed Project, which qualifies for inclusion in the BO issued to the Federal Transportation Agencies. To maintain this inclusion, a reinitiation of this project-level consultation is required where the Federal Highway Administration's discretionary involvement or control over the Project has been retained (or is authorized by law) and if:

1. new information reveals that the Project may affect listed species or critical habitat in a manner or to an extent not considered in the BO;
2. the Project is subsequently modified in a manner that causes an effect to listed species or designated critical habitat not considered in the BO; or
3. a new species is listed or critical habitat designated that the Project may affect.

In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending reinitiation.

Ronald Crickard
June 11, 2020

3

We appreciate your continued efforts to ensure that this Project is fully consistent with all applicable provisions of the BO. If you have any questions regarding our response, or if you need additional information, please contact Susi von Oettingen of this office at 603-227-6418.

Sincerely yours,

Thomas R. Chapman
Supervisor
New England Field Office

cc: Reading file
Ronald Crickard/NHDOT, via email
ES: SvonOettingen:jd:6-11-20:603-227-6418

**Section 106
Effect Memo**



Victoria F. Sheehan
Commissioner

THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION



William Cass, P.E.
Assistant Commissioner

Scour Stabilization
X-A004(779)
41915
RPR 11725

No Adverse Effect Memo

Pursuant to discussions and the New Hampshire Division of Historical Resources response on May 27, 2010 to the Request for Project Review, and for the purpose of compliance with regulations of the National Historic Preservation Act and the Advisory Council on Historic Preservation's *Procedures for the Protection of Historic Properties* (36 CFR 800), the NH Division of Historical Resources (NHDHR) and the NH Division of the Federal Highway Administration (FHWA) have coordinated the identification and evaluation of historical and archaeological resources with plans to conduct stabilization activities to address scour and stabilization issues at seven locations in New Hampshire, including in Dorchester, Landaff, Lyme, Rumney, Thornton and Woodstock. Some of these undertakings in project locations align with standards and procedures detailed in the Programmatic Agreement of the 2018 Federal-Aid Highway Program in New Hampshire.

Project Description

The project consists of stabilization efforts at seven locations to address scour issues and prevent additional scouring or undermining of existing crossings, and, where feasible, improve aquatic organism passage through the crossings. Work will include:

- **Dorchester 138/064**
NH Route 118 over Bucks Brook is located in Dorchester, NH. The existing bridge was constructed in 1964 and consists of two 5' diameter concrete pipes. The area will be stabilized by placing Class V riprap in the existing the scour pool and within the streambed for a length of approximately 45 feet at the outlet.
- **Dorchester 155/088**
River Road over the South Branch Baker River is located in Dorchester, NH. The existing 40-foot clear span steel I-beam with concrete deck bridge is experiencing channel degradation that has exposed the footings. Class IX riprap will be placed approximately 15 feet upstream and downstream of the bridge and within the bridge to prevent further degradation of the river. Class IX riprap will be placed in an area of bank erosion in the southwest quadrant of the bridge for a length of approximately 45 feet.
- **Landaff 079/156**
Millbrook Road over Mill Brook is located in Landaff, NH. The 30-foot span concrete arch bridge is experiencing bank erosion along the upstream northeast wingwall. Class VII riprap will be placed for a length of approximately 25 feet along the wingwall and bank and for a length of approximately 10 feet within the brook for approximately 12 feet upstream to stabilize the location. Channel excavation may be needed to install the proposed riprap.
- **Lyme 075/106**
NH Route 10 over Grant Brook is located in Lyme, NH. The 30-foot span concrete rigid frame structure is experiencing severe channel degradation that has exposed the footings. Class IX riprap will be placed upstream and downstream of the bridge and within the bridge to prevent further degradation of the brook. Class IX riprap will be placed in an area of bank erosion in the northeast quadrant of the bridge.

- Rumney 105/063
NH Route 25 over Halls Brook is located in Rumney, NH. The 22-foot span concrete box culvert has a large and deep scour pool that has formed at the outlet. Granular fill and Class IX riprap will be used to fill the scour hole. The riprap limits will extend approximately 65 feet downstream of the bridge.
- Thornton 203/088
NH Route 175 over Mill Brook is located in Thornton, NH. The 41-foot clear span concrete T-beam structure bridge is experiencing channel degradation that has exposed the footings. Class VII riprap will be placed upstream and downstream of the bridge and within the bridge to prevent further degradation of the brook. The limits of the Class VII riprap will extend approximately 21 feet upstream and downstream of the existing crossing.
- Woodstock 203/079
I-93 over Eastman Brook is located in Woodstock, NH. The existing 42-foot span structure is a twin cell concrete box culvert (18' clear span each barrel) that originally included riprap at the culvert at the inlet and outlet. This riprap has washed away at the downstream outlet, and significant bank erosion has occurred where the Eastman Brook's bend has been propagating toward a private landowner's property, approximately 300-feet downstream of the crossing. Proposed stabilization measures would include installation of A Jacks or an armor matrix component system on the outlet side within the streambed and Class IX riprap to be placed on the banks for approximately 87 feet. There is steel sheeting in the river on the downstream side that will be cutoff at the armor matrix bottom elevation as needed for installation.

The Areas of Potential Effect (APEs) include the footprints of the above-listed bridges and associated NHDOT Right-of-Ways, areas of proposed scour repair, and construction access roads depicted on each site's project plans.

Identification

Above-Ground Resources Within or Near Combined APE

- Boston, Concord and Montreal Railroad Historic District – Concord to Plymouth Branch
 - NHDHR Inventory # ZMT-BCMR
 - Determined eligible for listing in the National Register – 8/14/2003
 - Meets National Register Criteria for A - Event and C -Architecture/Engineering
- Groton Wind Project
 - NHDHR Inventory # ZMT-GRWP
 - Not evaluated for National Register Individual or District Eligibility – 1/26/2011
- Landaff Bridge 079/156
 - SRI No. 014200790015600
 - Determined eligible for listing in the National Register – 12/20/2019
 - Concrete Closed Spandrel Arch Structure
 - Meets National Register Criterion A for Event
- Lyme Common Historic District
 - NHDHR Inventory # BRW0001
 - Determined eligible for listing in the National Register – 6/8/1988
 - Meets National Register Criteria for A - Event and C -Architecture/Engineering

- Northern Pass White Mountains Region
 - NHDHR Inventory # ZMT-NPWM
 - Not evaluated for National Register Individual or District Eligibility – 4/30/2015

Archaeology

- Areas of Potential Effect at each location considered archaeologically sensitive based on topography and setting, specifically within proposed construction access routes.

Public Consultation

- Project details provided to Lyme Heritage Commission; Letter of Support received - 12/2/2019
- NHDOT Natural Resources Agency Meeting – 4/15/2020
- RPR Originally Reviewed by NHDHR – 5/27/2020
- Additional Information Reviewed by NHDOT Cultural Resources Staff and NHDHR – 6/11/2020

Determination of Effect

Above-Ground Resources

- Boston, Concord and Montreal Railroad Historic District – Concord to Plymouth Branch
 - There would be no adverse effect to the railroad district
 - Rumney Bridge 105/063 is not a contributing resource to the railroad historic district.
- Groton Wind Project
 - There would be no direct or indirect impacts to this resource.
- Landaff Bridge 079/156
 - There would be no adverse effect to the historic structure if repair and repointing of stone wall follows guidance in the Substructure section of the National Park Service's Guidelines for Rehabilitating Historic Covered Bridges.
 - This condition shall be added as an Environmental Commitment to the project's Programmatic Categorical Exclusion.
- Lyme Common Historic District
 - There would be no direct or indirect impacts to this resource.
 - Lyme Bridge 075/106 is not a contributing resource to the historic district.
 - Letter of Support received from Lyme Heritage Commission - 12/2/2019
- Northern Pass White Mountains Region
 - There would be no direct or indirect impacts to this resource.
- The resulting finding for above-ground resources is: **No Adverse Effect to Historic Properties.**

Archaeological Resources

- There would be no adverse effect to archaeologically sensitive resources with the following conditions:
 - Construction access routes would be limited to areas demarcated on project plans.
 - Vegetation clearing would be necessary for construction access routes, but stumping and underground grubbing would be avoided to leave any subterranean resources intact.
 - Excavation for construction access would be avoided where possible and limited to steep slopes.

- The conditions above shall be added as an Environmental Commitment to the project's Programmatic Categorical Exclusion.

- The resulting finding is: **No Adverse Effect to Archaeological Resources**

Based on a review pursuant to 36 CFR 800.4, NHDOT has determined that no historic or archaeological resources in the project area would be adversely affected and that no further survey work is needed.

The result of identification and evaluation for the proposed contract is a finding of: **No Adverse Effect.**

Section 4(f) (to be completed by FHWA)	There Will Be:	<input checked="" type="checkbox"/> No 4(f);	<input type="checkbox"/> Programmatic 4(f);	<input type="checkbox"/> Full 4 (f); or
	<input type="checkbox"/> A finding of <i>de minimis</i> 4(f) impact as stated: In addition, with NHDHR concurrence of no adverse effect for the above undertaking, and in accordance with 23 CFR 774.3, FHWA intends to, and by signature below, does make a finding of <i>de minimis</i> impact. NHDHR's signature represents concurrence with both the no adverse effect determination and the <i>de minimis</i> findings. Parties to the Section 106 process have been consulted and their concerns have been taken into account. Therefore, the requirements of Section 4(f) have been satisfied.			

In accordance with the Advisory Council's regulations, we will continue to consult, as appropriate, as this project proceeds.

**JAMISON S
SIKORA**

Digitally signed by JAMISON S
SIKORA
Date: 2020.06.29 05:58:31
-04'00'

6/26/2020

Shelia Charles

Jamison S. Sikora, Env. Program Manager Date
Federal Highway Administrator

Jill Edelmann Date
Cultural Resources Manager

Concurred with by the NH State Historic Preservation Officer:

Nadine Miller, DSHR 6/29/2020

Nadine Miller Date
Deputy State Historic Preservation Officer
NH Division of Historical Resources

c.c. David Trubey, NHDHR Laura Black, NHDHR
Marika Labash, NHDHR Ronald Crickard, DOT
Jamie Sikora, FHWA David Scott, NHDOT
Joanne Theriault, HTA

**Wetland Delineation Report, Functional
Assessment & Site Photos
Stoney Ridge Environmental, LLC**

WETLAND DELINEATION & INVASIVE SPECIES REPORT

STATEWIDE SCOUR PROJECT DORCHESTER, EASTON, LANDAFF, LYME, RUMNEY, THORNTON, WOODSTOCK, NEW HAMPSHIRE

Prepared For:

Hoyle, Tanner, & Associates
150 Dow Street
Manchester, NH 03101



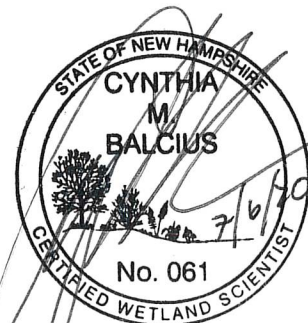
Prepared By:



233 Prospect Mountain Road
Alton, New Hampshire 03809
Phone: (603) 776-5825 Fax: (603) 776-5826

September 2019

SRE # 18-138



Wetland Delineation & Invasive Species Report

Statewide Scour Project

Dorchester, Easton, Landaff, Lyme, Rumney, Thornton, Woodstock, New Hampshire

Introduction

The purpose of this report is to document the field data collected by Stoney Ridge Environmental LLC (SRE) for the Statewide Scour Project. SRE was contracted by Hoyle, Tanner & Associates (HTA) to complete a wetland delineation, invasive species delineation and a function and value assessment at 9 sites across Northern New Hampshire and provide a report documenting the results. The delineation was completed for edge of jurisdictional wetland, ordinary high water mark, and top of bank. The sites consisted of 9 stream crossings in the towns of Dorchester, Easton, Landaff, Lyme, Rumney, Thornton, and Woodstock. All sites were crossings of upper perennial streams.

Site Description

For the purposes of this report, each site was given a site number. Site numbers can be found in the table below.

Table 1: Summary of Site Numbers

Site Number	Road of Crossing	Stream	Town
1	Route 118	Buck's Brook	Dorchester
2	River Road	South Branch Baker River	Dorchester
3	Easton Road	Unknown	Easton
4	Millbrook Road	Mill Brook	Landaff
5	Route 10	Grant Brook	Lyme
6	Route 25	Hall's Brook	Rumney
7	Route 175	Mill Brook	Thornton
8	Eastside Road	Pemigewasset River	Woodstock
9	Route 93	Eastman Brook	Woodstock

Methods

Field work for this project was completed on May 14, 15, and 16 of 2019. Arctic pink flagging was utilized for edge of jurisdictional wetlands, blue polka dotted flagging was utilized for ordinary high water mark, and red striped flagging was utilized for top of bank. All pertinent flagging was GPS located using an Sokkia GRX 2 GPS unit with sub-meter resolution capabilities. Locations of any invasive species within the project area were also GPS located. The GPS located flags were overlaid on an aerial images of the project areas. A plan for each site

depicting edge of jurisdictional wetlands, ordinary high water mark, and top of bank is provided as a part of this report. These plans also show the locations of any invasive species, as well as the classification of the streams and any wetlands within the project area. Wetlands were classified using the criteria outlined in the “Classification of Wetlands and Deepwater Habitats of the United States” (Cowardin et al. 1979). A function and value assessment was completed for each site using the Army Corps Highway Methodology.

All of the wetland delineations within the project area utilized the following standards:

- 1) United States Department of Agriculture, Natural Resources Conservation Service. 2016. *Field Indicators of Hydric Soils in the United States*, Version 8.0. L.M. Vasilas, G.W. Hurt, and J.F. Berkowitz (eds.). USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.
- 2) *Field Indicators for Identifying Hydric Soils In New England*. Version 4. May 2017. New England Hydric Soils Technical Committee.
- 3) *North American Digital Flora: National Wetland Plant List, version 2.1.0* (http://wetland_plants.usace.army.mil). U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH, and BONAP, Chapen Hill.
- 4) *The National Wetland Plant List: 2016 wetland ratings*. Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *Phytoneuron* 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X.
- 5) *Corps of Engineers Wetlands Delineation Manual*. January 1987. Wetlands Research Program Technical Report Y-87-1.
- 6) *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*. January 2012, version 2. U.S. Army Corps of Engineers. Environmental Laboratory ERDC/EL TR-12-1.
- 7) *Classification of Wetlands and Deepwater Habitats of the United States*. December 1979. L. Cowardin, V. Carter, F. Golet, and E. LaRoe. US Department of the Interior. Fish and Wildlife Service. FWS/OBS-79/31.

Discussion

Site 1:

Site one is a stream crossing located on Route 118 in Dorchester, New Hampshire on Buck's Brook. This crossing features a dual concrete pipe structure. SRE performed the delineation approximately 75 feet up and downstream of the crossing. The stream is classified as riverine, upper perennial with an unconsolidated bottom composed of cobble-gravel and sand (R3UB1/2). This stream is shallow and relatively fast moving, flowing east within the project area. There are jurisdictional wetlands adjacent to this stream, which are classified as riverine, upper perennial, unconsolidated shore composed of cobble-gravel and sand (R3US1/2), as well as palustrine, forested, with broad leaved deciduous vegetation that is seasonally flooded/saturated (PFO1E). These areas are all depicted on the attached plan.



This is a view of the crossing structure looking upstream.

Upland areas surrounding the stream feature forested land dominated by white pine (*Pinus strobus*), red maple (*Acer rubrum*), and speckled alder (*Alnus incana*) in the overstory, and goldenrod (*Solidago spp.*) and aster (*Symphyotrichum spp.*) in the understory. The adjacent forested wetland is dominated by red maple (*Acer rubrum*) and speckled alder (*Alnus incana*) in the overstory, and meadowsweet (*Spiraea alba*) and various sedges (*Carex spp.*) in the understory/groundcover. Multiple stands of the invasive species Japanese knotweed (*Fallopia japonica*) were observed within the project area. The extent of these stands were located with the GPS, and are depicted on the attached plan.

An annotated function and value assessment was performed for this site using the Army Corps Highway Methodology. It was determined that this system exhibits the following functions: floodflow alteration due to adjacent floodplain wetland, fish habitat, production export, sediment/shoreline stabilization which is also due to the adjacent floodplain wetland, and wildlife habitat. Wildlife habitat is diverse in this area, as there is a large field on one side of the stream, and the other side is surrounded by forested land.

PHOTO LOG

Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 1: This is a view of the inlet of the crossing structure at site 1.



PHOTO 2: This is a view of the outlet of the crossing structure at site 1.



PHOTO LOG

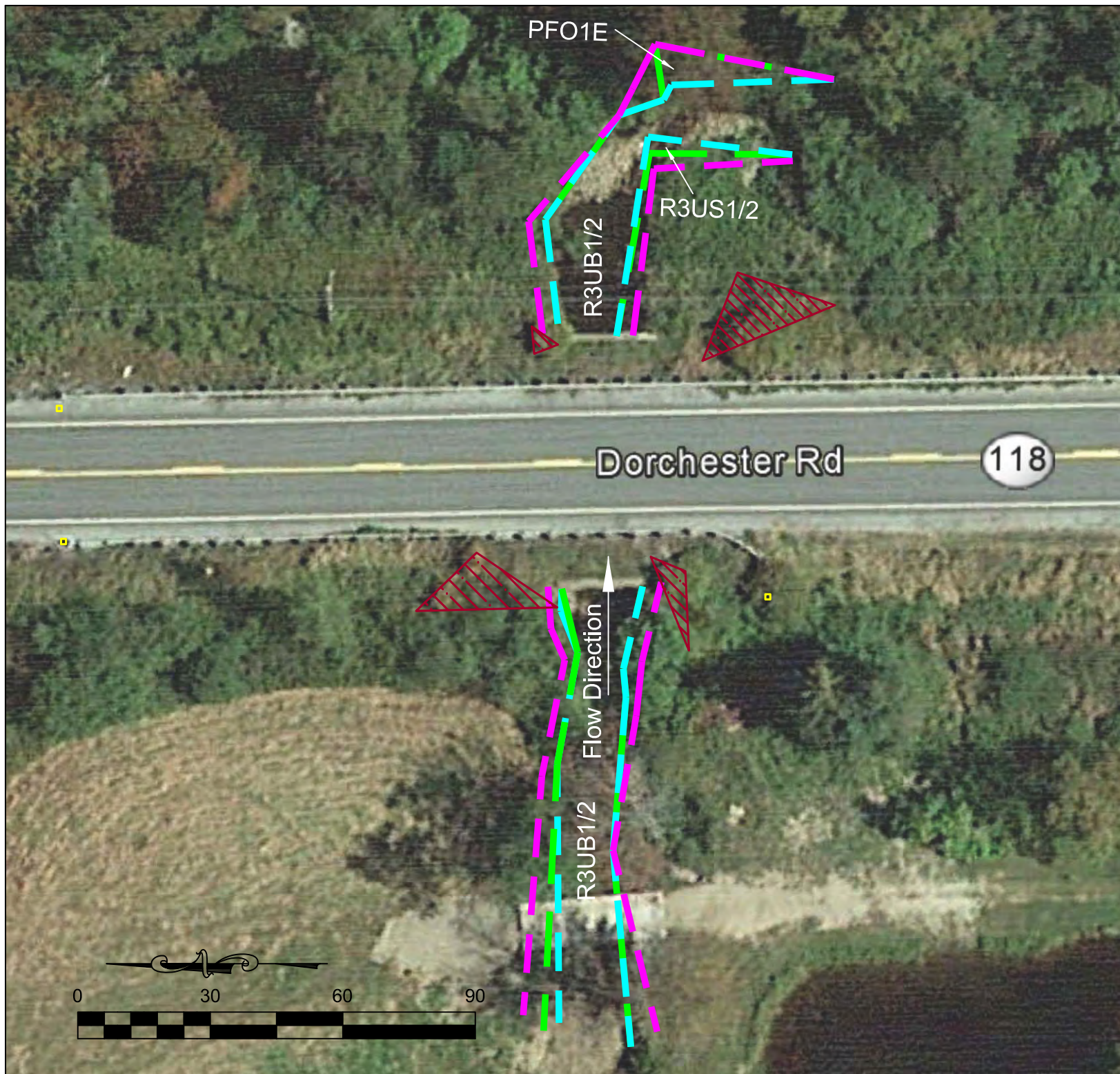
Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 3: This is a view looking upstream away from the crossing at site 1.



PHOTO 4: This is a view looking upstream towards the crossing structure at site 1.





Legend

- Top of Bank
- Edge of Jurisdictional Wetland
- Ordinary High Water Mark
- Japanese Knotweed

Plan Notes

- All points were located using a GPS unit with sub-meter resolution.
- Jurisdictional wetlands on site were delineated by Stoney Ridge Environmental LLC on 5/15/2019

Existing Conditions
Site 1 - Route 118
Dorchester, NH



229 Prospect Mountain Road
Phone: 603-776-5825
Fax: 603-776-5826
www.stoneyridgeenv.com

Site 2

Site 2 is a stream crossing located on River Road in Dorchester, New Hampshire on the south branch of the Baker River. This crossing is an open bottom box structure. SRE performed the delineation approximately 75 feet up and downstream of the crossing. The stream is classified as riverine, upper perennial with an unconsolidated bottom composed of cobble-gravel and sand (R3UB1/2). This is a fast moving, shallow stream with a deep pool directly south of the crossing. This pool indicates scouring of the channel, which could be due to an undersized crossing. The stream flows north-northwest in the project area. There are jurisdictional wetlands adjacent to this stream, which are classified as riverine, upper perennial, unconsolidated shore composed of cobble-gravel and sand (R3US1/2), as well as palustrine, forested, with broad leaved deciduous and needle leaved evergreen vegetation that is seasonally flooded/saturated (PFO1/4E). These areas are all depicted on the attached plan.



This is a view looking upstream towards the crossing structure.

Surrounding upland areas feature forested land dominated by eastern hemlock (*Tsuga canadensis*), pin cherry (*Prunus pensylvanica*), red maple (*Acer rubrum*), and American beech (*Fagus grandifolia*) in the overstory, and hobble bush (*Viburnum lantanoides*) and bracken fern (*Pteridium aquilinum*) as groundcover. The adjacent forested wetland is dominated by red maple (*Acer rubrum*) and eastern hemlock (*Tsuga canadensis*). No invasive species were observed within the project area.

An annotated function and value assessment was performed for this site using the Army Corps Highway Methodology. It was determined that this system exhibits the following functions: floodflow alteration, fish habitat, production export, sediment/shoreline stabilization and wildlife habitat. Floodflow alteration and sediment/shoreline stabilization stem from the adjacent floodplain wetland. Although wildlife habitat is present, it is limited due to the upstream portion of the stream flowing very close to the road.

PHOTO LOG

Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 5: This is a view of the inlet of the crossing structure at site 2.



PHOTO 6: This is a view of the outlet of the crossing structure at site 2.



PHOTO LOG

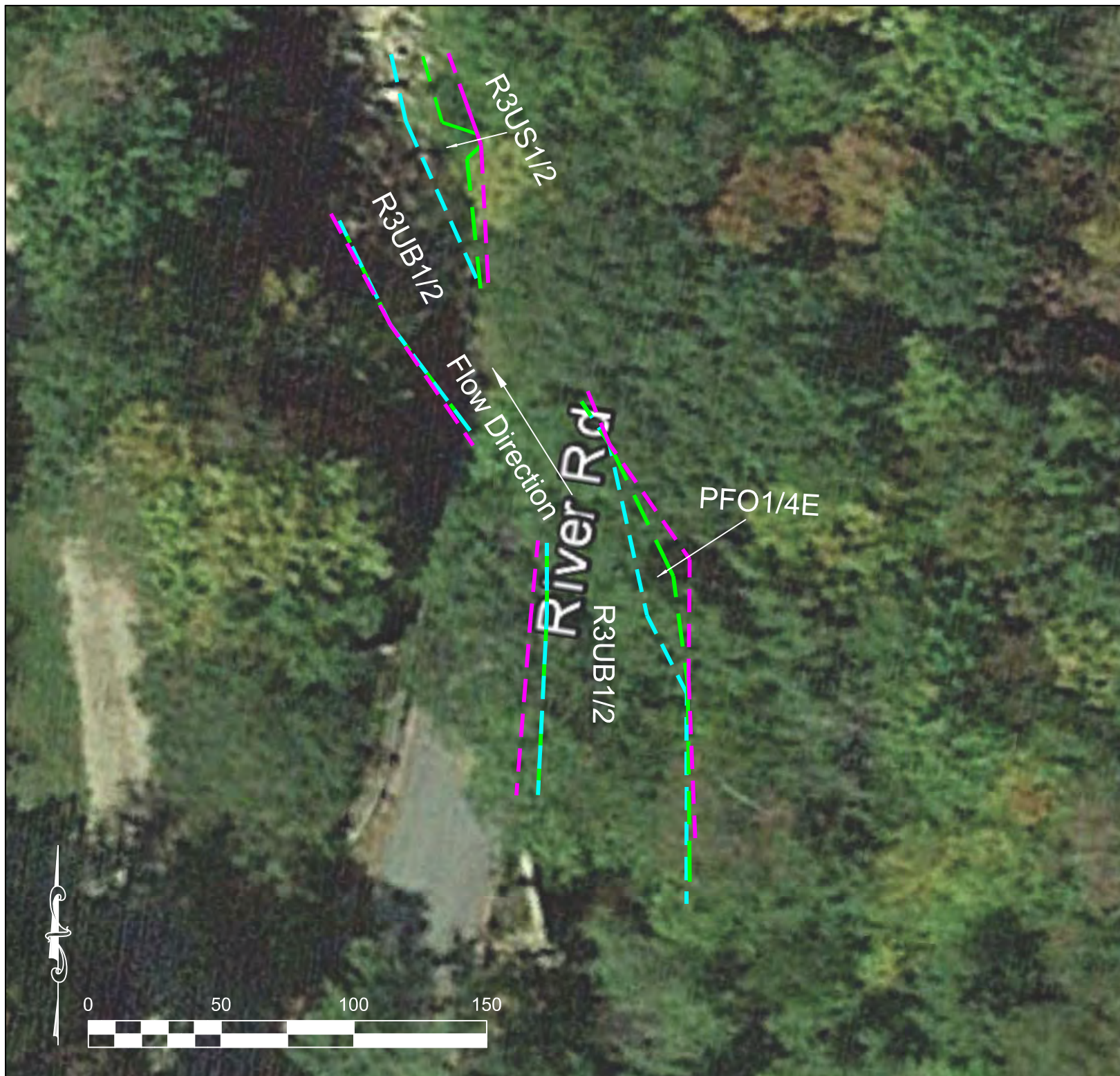
Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 7: This is a view looking downstream away from the crossing at site 2.



PHOTO 8: This is a view looking upstream away from the crossing at site 2.





Legend

- Top of Bank
- Edge of Jurisdictional Wetland
- Ordinary High Water Mark

Plan Notes

- All points were located using a GPS unit with sub-meter resolution.
- Jurisdictional wetlands on site were delineated by Stoney Ridge Environmental LLC on 5/15/2019

Existing Conditions
Site 2 - River Road
Dorchester, NH



229 Prospect Mountain Road
Phone: 603-776-5825
Fax: 603-776-5826
www.stoneyridgeenv.com

Site 3:

Site 3 is a stream crossing located on Easton Road in Easton, New Hampshire. This crossing is a three sided open bottom box structure. SRE completed the delineation approximately 75 feet up and downstream of the crossing. The stream is classified as riverine, upper perennial with an unconsolidated bottom composed of cobble-gravel and sand (R3UB1/2). The stream is a shallow and fast moving, flowing north-northwest in the project area. There is an area of adjacent wetland that is classified as palustrine, forested, with broad leaved deciduous vegetation that is seasonally flooded/saturated (PFO1E). This area is depicted on the attached plan.



This is a view of the crossing structure looking upstream.

Upland areas around the stream feature forested land dominated by balsam fir (*Abies balsamea*), red maple (*Acer rubrum*), and yellow birch (*Betula alleghaniensis*). The adjacent forested wetland is dominated by red maple (*Acer rubrum*) and yellow birch (*Betula alleghaniensis*). The invasive species honeysuckle (*Lonicera spp.*) was observed within the project area. Only a single individual was observed, and its location is depicted on the attached plan.

An annotated function and value assessment was performed for this site using the Army Corps Highway Methodology. It was determined that this system exhibits the following functions: floodflow alteration, fish habitat, production export, sediment/shoreline stabilization and wildlife habitat. Floodflow alteration and sediment/shoreline stabilization are minimal at this site due to the small amount of floodplain wetland. Similar to site 2, wildlife habitat is limited due to the stream flowing very close to the road.

PHOTO LOG

Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 9: This is a view looking downstream towards the inlet of the crossing structure at site 3.



PHOTO 10: This is a view of the outlet of the crossing structure at site 3.



PHOTO LOG

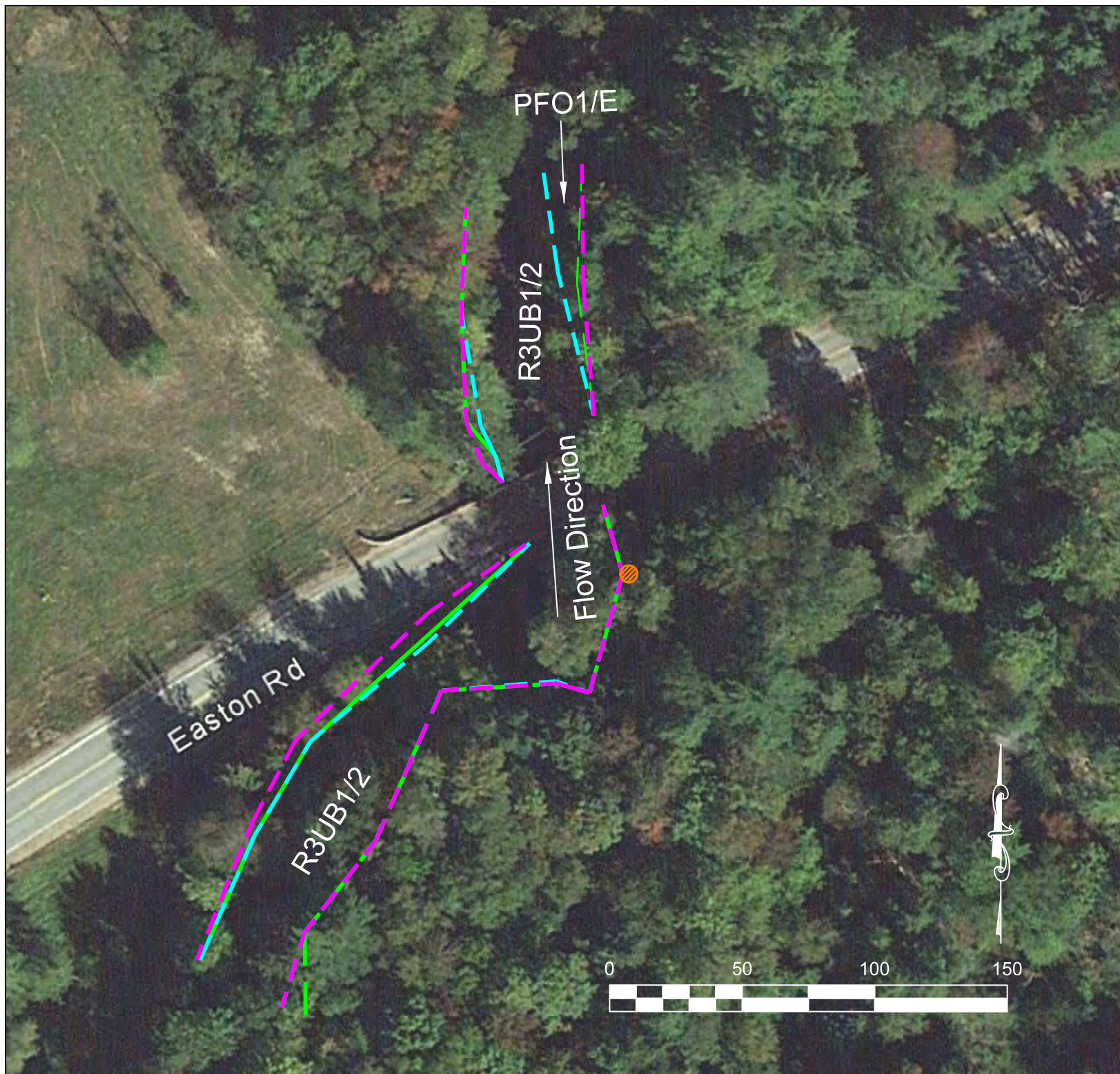
Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 11: This is a view looking upstream away from the crossing at site 3.



PHOTO 12: This is a view looking downstream away from the crossing at site 3.





Legend

- Top of Bank
- Edge of Jurisdictional Wetland
- Ordinary High Water Mark
- Honeysuckle

Plan Notes

- All points were located using a GPS unit with sub-meter resolution.
- Jurisdictional wetlands on site were delineated by Stoney Ridge Environmental LLC on 5/14/2019

Existing Conditions
Site 3 - Easton Road
Easton, NH



229 Prospect Mountain Road
Phone: 603-776-5825
Fax: 603-776-5826
www.stoneyridgeenv.com

Site 4:

Site 4 is a stream crossing located on Millbrook Road in Landaff, New Hampshire on Mill Brook. This crossing is an open bottom arch structure. SRE performed the delineation approximately 75 feet up and downstream of the crossing. The stream is classified as riverine, upper perennial with an unconsolidated bottom composed of cobble-gravel and sand (R3UB1/2). The stream is shallow and fast moving, flowing west in the project area. There were multiple areas of adjacent wetland, which are all classified as palustrine, forested, with needle leaved evergreen vegetation that is seasonally flooded/saturated (PFO4E). These areas are depicted on the attached plan.



This is a view looking downstream towards the crossing structure.

Adjacent upland areas are dominated by balsam fir (*Abies balsamea*), eastern hemlock (*Tsuga canadensis*), and red maple (*Acer rubrum*). The forested wetlands are dominated by the same tree species, but also feature green false hellebore (*Veratrum viride*) as groundcover. The invasive species honeysuckle (*Lonicera spp.*) as well as a small stand of Japanese knotweed (*Fallopia japonica*) were observed within the project area. The locations of these invasive species are depicted on the attached plan.

An annotated function and value assessment was performed for this site using the Army Corps Highway Methodology. It was determined that this system exhibits the following functions: floodflow alteration, fish habitat, production export, sediment/shoreline stabilization and wildlife habitat. Floodflow alteration and sediment/shoreline stabilization are high at this site due to the large amount of floodplain wetland present.

PHOTO LOG

Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 13: This is a view of the inlet of the crossing structure at site 4.



PHOTO 14: This is a view looking towards the outlet of the crossing structure at site 4.



PHOTO LOG

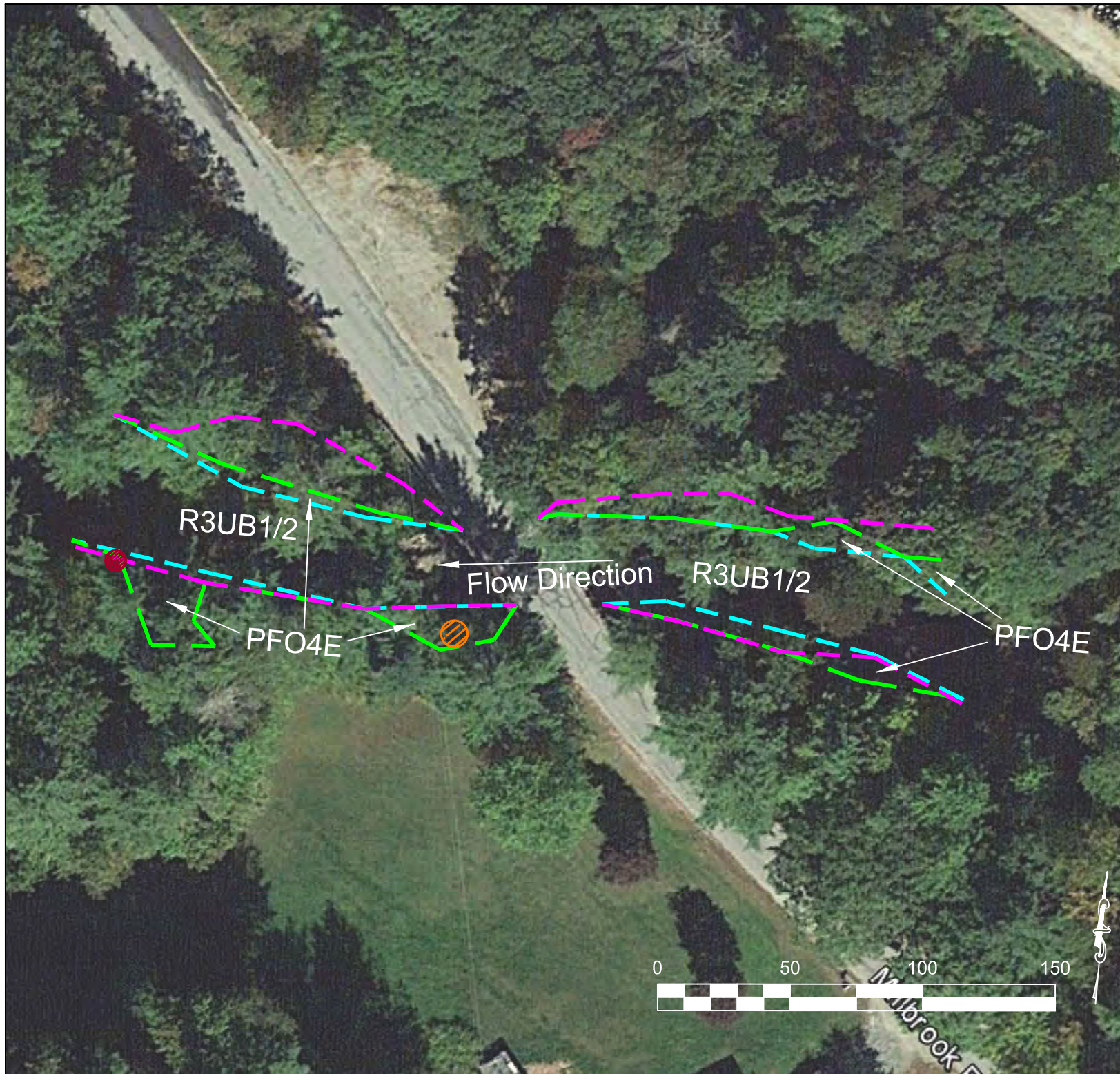
Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 15: This is a view looking downstream away from the crossing structure at site 4.





PHOTO 16: This is a view looking upstream away from the crossing structure at site 4. Floodplain wetland can be seen on the right side of this photo.





Legend

- Top of Bank
- Edge of Jurisdictional Wetland
- Ordinary High Water Mark
-  Japanese Knotweed
-  Honeysuckle

Plan Notes

- All points were located using a GPS unit with sub-meter resolution.
- Jurisdictional wetlands on site were delineated by Stoney Ridge Environmental LLC on 5/14/2019

Existing Conditions Site 4 - Millbrook Rd Landaff, NH



229 Prospect Mountain Road
Phone: 603-776-5825
Fax: 603-776-5826
www.stoneyridgeenv.com

Site 5:

Site 5 is a stream crossing located on Route 10 in Lyme, New Hampshire on Grant Brook. This crossing is a large 3 sided open bottom box structure. SRE performed the delineation approximately 75 feet up and downstream of the crossing. The stream is classified as riverine, upper perennial with an unconsolidated bottom composed of cobble-gravel and sand (R3UB1/2). The stream is a fast moving and shallow, flowing west in the project area. Ephemeral streams draining nearby wetlands enter the main channel in two locations, both of which are depicted on the attached plan. Adjacent wetland areas are classified as riverine, upper perennial, unconsolidated shore composed of cobble-gravel and sand (R3US1/2) and are also depicted on the attached plans.



This is a view looking upstream towards the crossing structure.

Adjacent upland areas are forested and are dominated by speckled alder (*Alnus incana*), sugar maple (*Acer saccharum*), and black locust (*Robinia pseudoacacia*) in the overstory, with goldenrod (*Solidago spp.*), aster (*Symphyotrichum spp.*), and jewel weed (*Impatiens capensis*) dominating the understory/groundcover. Multiple stands of the invasive species Japanese knotweed (*Fallopia japonica*) were observed within the project area. The extent of these stands were located with the GPS, and are depicted on the attached plan.

An annotated function and value assessment was performed for this site using the Army Corps Highway Methodology. It was determined that this system exhibits the following functions: floodflow alteration, fish habitat, production export, sediment/shoreline stabilization and wildlife habitat. Floodflow alteration is high at this site due to the large amount of floodplain wetland. This system also has recreational value, as it is part of a public nature preserve with walking trails.

PHOTO LOG

Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 17: This is a view of the inlet of the crossing structure at site 5.



PHOTO 18: This is a view of the outlet of the crossing structure at site 5.



PHOTO LOG

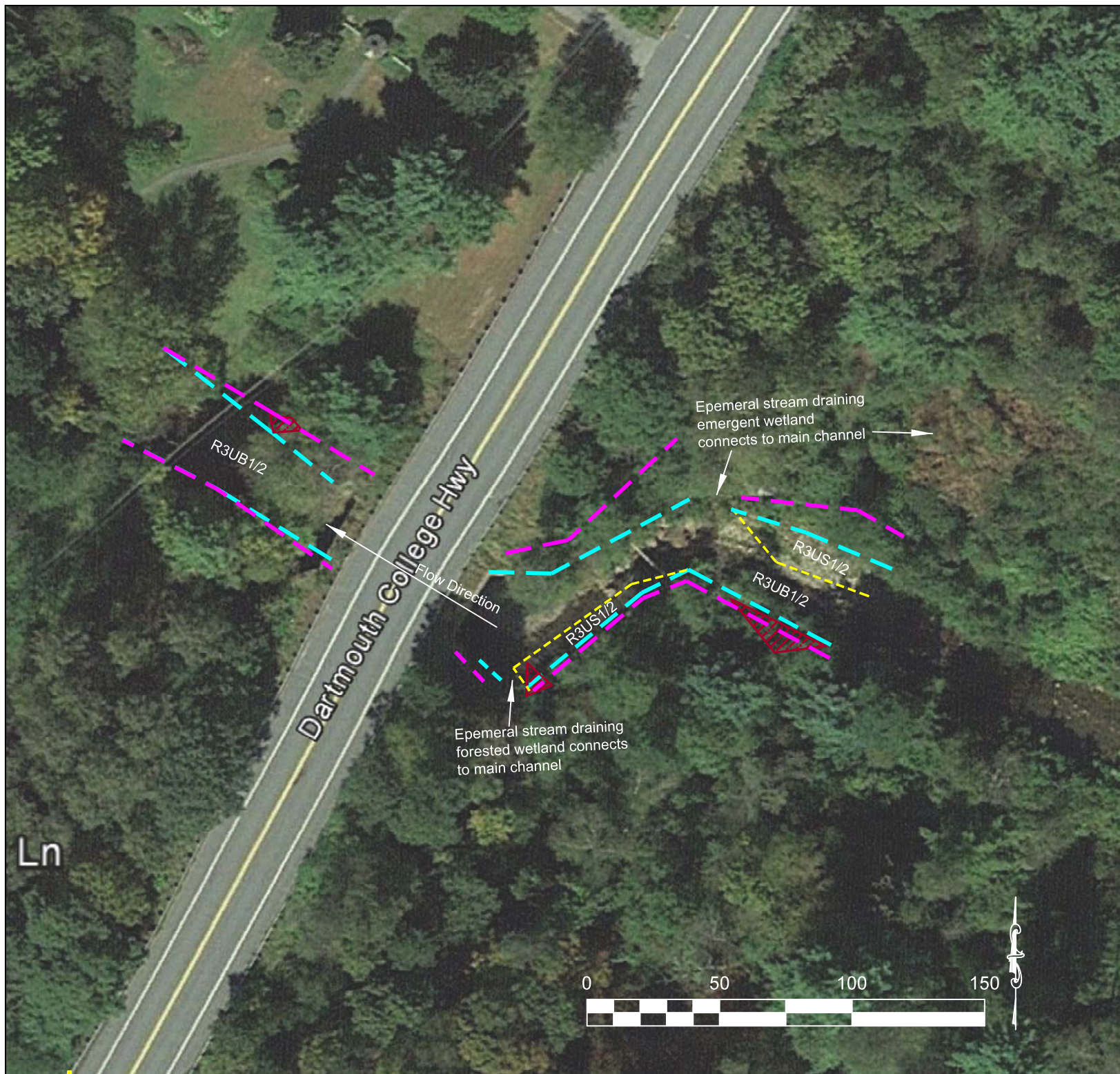
Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 19: This is a view looking upstream away from the crossing structure at site 5.



PHOTO 20: This is a view looking downstream away from the crossing structure at site 5.





Legend

- Top of Bank
- Edge of Jurisdictional Wetland
- Ordinary High Water Mark
- Change in Classification
- Japanese Knotweed

Plan Notes

All points were located using a GPS unit with sub-meter resolution. Jurisdictional wetlands on site were delineated by Stoney Ridge Environmental LLC on 5/15/2019

Existing Conditions Site 5 - Route 10 Lyme, NH



233 Prospect Mountain Road
Phone: 603-776-5825
Fax: 603-776-5826
www.stoneyridgeenv.com

Site 6:

Site 6 is a stream crossing located on Route 25 in Rumney, New Hampshire on Hall's Brook. This crossing is a large four sided box structure. SRE performed the delineation approximately 75 feet up and downstream of the crossing. The stream is classified as riverine, upper perennial with an unconsolidated bottom composed of cobble-gravel and sand (R3UB1/2). The stream is shallow and fast moving and flows north in the project area. A large pool is located at the outlet of the crossing structure. Scouring of the channel has caused degradation and subsequent aggradation of materials just downstream of the outlet of the culvert. An intermittent stream enters the main channel just south of the crossing structure.

This other stream is classified as riverine, intermittent with a streambed composed of cobble-gravel and sand (R4SB3/4). All adjacent wetland areas are classified as riverine, upper perennial, unconsolidated shore composed of cobble-gravel and sand (R3US1/2). These areas of adjacent wetland as well as the intermittent stream are depicted on the attached plan.



This is a view looking upstream towards the crossing structure.

Adjacent upland areas feature forested land and are dominated by white pine (*Pinus strobus*), red maple (*Acer rubrum*), and paper birch (*Betula papyrifera*). The invasive species Japanese knotweed (*Fallopia japonica*) and Japanese barberry (*Berberis thunbergii*) were observed on site, and their locations are depicted on the attached plan.

An annotated function and value assessment was performed for this site using the Army Corps Highway Methodology. It was determined that this system exhibits the following functions: floodflow alteration, fish habitat, production export, sediment/shoreline stabilization and wildlife habitat. Floodflow alteration and sediment/shoreline stabilization are relatively low at this site due to minimal floodplain wetland.

PHOTO LOG

Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 21: This is a view of the inlet of the crossing structure at site 6.



PHOTO 22: This is a view of the outlet of the crossing structure at site 6.



PHOTO LOG

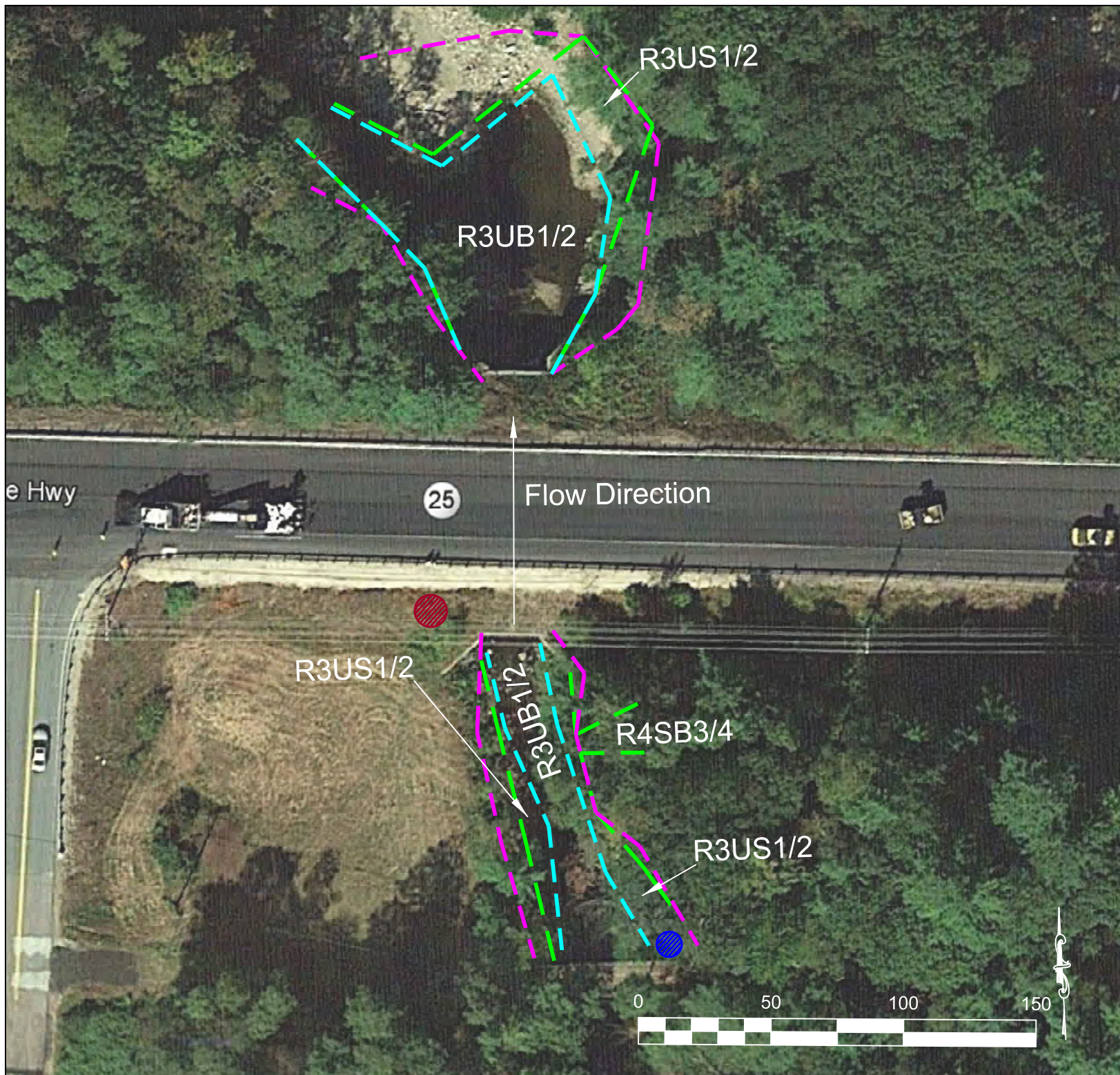
Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 23: This is a view looking downstream away from the crossing structure at site 6.



PHOTO 24: This is a view looking upstream away from the crossing structure at site 6.





Legend

- Top of Bank
- Edge of Jurisdictional Wetland
- Ordinary High Water Mark
- ⊘ Japanese Knotweed
- ⊘ Japanese Barberry

Plan Notes

- All points were located using a GPS unit with sub-meter resolution.
- Jurisdictional wetlands on site were delineated by Stoney Ridge Environmental LLC on 5/16/2019

Existing Conditions
Site 6 - Route 25
Rumney, NH



229 Prospect Mountain Road
Phone: 603-776-5825
Fax: 603-776-5826
www.stoneyridgeenv.com

Site 7

Site 7 is a stream crossing located on Route 175 in Thornton, New Hampshire on Mill Brook. This crossing is a three sided open bottom box structure. SRE performed the delineation approximately 75 feet up and downstream of the crossing. The stream is classified as riverine, upper perennial with an unconsolidated bottom composed of cobble-gravel and sand (R3UB1/2). The stream is fast moving, relatively shallow, and flows west in the project area. There are jurisdictional wetlands adjacent to this stream, which are classified as riverine, upper perennial, unconsolidated shore composed of cobble-gravel and sand (R3US1/2), as well as palustrine, forested, with broad leaved deciduous vegetation that is seasonally flooded/saturated (PFO1E). There is also drainage from an adjacent pond that enters the stream, which is classified as riverine, intermittent with a streambed composed of cobble-gravel and sand (R4SB3/4). All adjacent wetlands as well as the pond drainage are depicted on the attached plan.



This is a view looking downstream towards the crossing structure.

Adjacent upland areas feature forested land and are dominated by white pine (*Pinus strobus*), sugar maple (*Acer saccharum*) and eastern hemlock (*Tsuga canadensis*). The adjacent forested wetlands are dominated by red maple (*Acer rubrum*) in the overstory, and meadowsweet (*Spiraea alba*) in the understory. No invasive species were observed within the project area.

An annotated function and value assessment was performed for this site using the Army Corps Highway Methodology. It was determined that this system exhibits the following functions: floodflow alteration due to the floodplain wetlands, fish habitat, production export, sediment/shoreline stabilization and wildlife habitat. Similar to site 1, wildlife habitat is diverse in this area due to the presence of both field and forested habitats.

PHOTO LOG

Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 25: This is a view of the inlet of the crossing structure at site 7.



PHOTO 26: This is a view of the outlet of the crossing structure at site 7.



PHOTO LOG

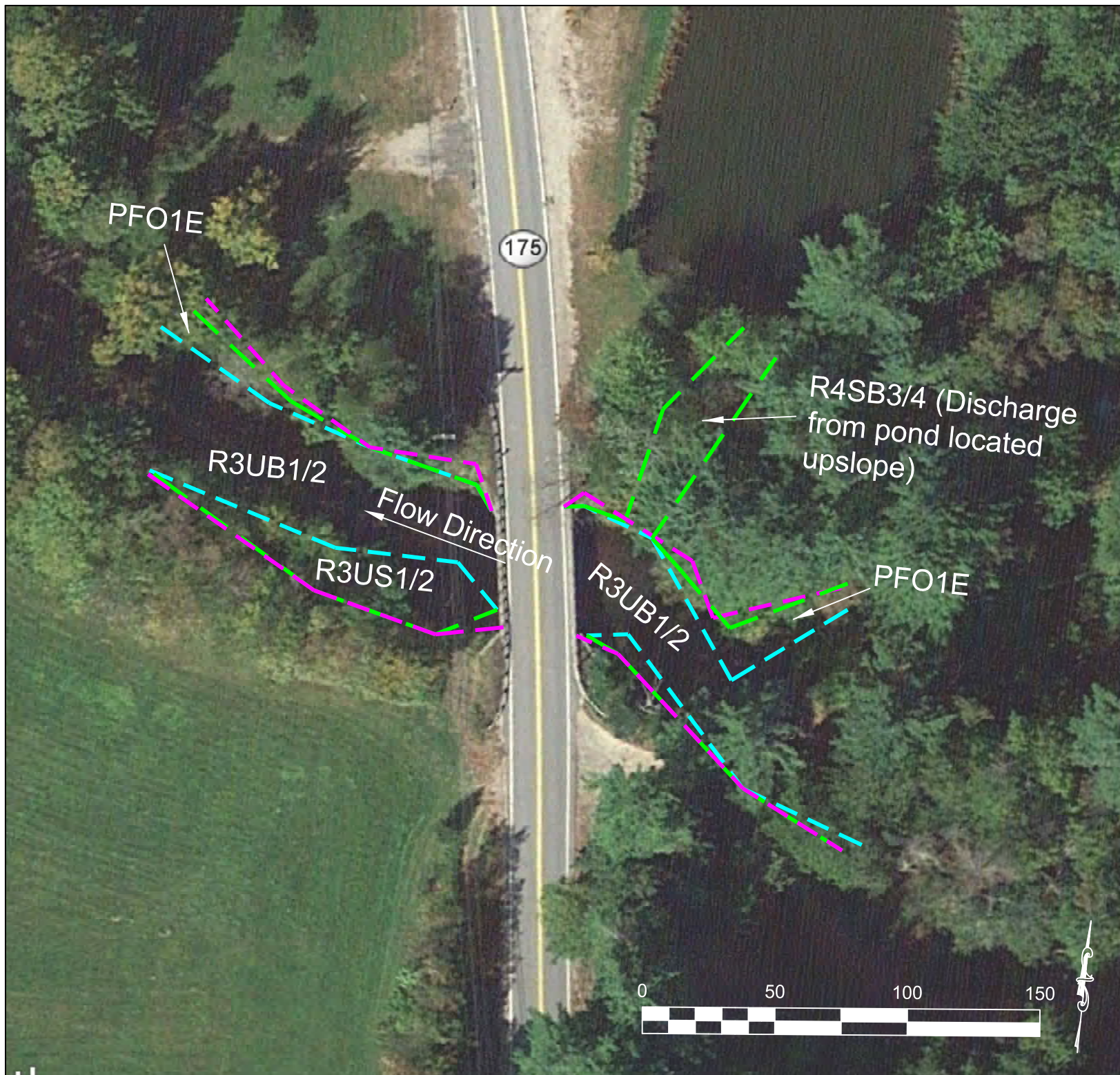
Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 27: This is a view looking downstream away from the crossing structure at site 7.



PHOTO 28: This is a view looking upstream away from the crossing structure at site 7.





Legend

- Top of Bank
- Edge of Jurisdictional Wetland
- Ordinary High Water Mark

Plan Notes

- All points were located using a GPS unit with sub-meter resolution.
- Jurisdictional wetlands on site were delineated by Stoney Ridge Environmental LLC on 5/16/2019

Existing Conditions
Site 7 - Route 175
Thornton, NH



229 Prospect Mountain Road
Phone: 603-776-5825
Fax: 603-776-5826
www.stoneyridgeenv.com

Site 8

Site 8 is a stream crossing located on Eastside Road in Woodstock, New Hampshire on the Pemigewasset River. This crossing is a large span structure supported by two concrete piers. SRE performed the delineation approximately 85-125 feet up and downstream of the crossing. This stream is large, fast moving, relatively deep, and flows south-southeast in the project area. It is classified as riverine, upper perennial with an unconsolidated bottom composed of cobble-gravel and sand (R3UB1/2). There are jurisdictional wetlands adjacent to the stream, which are classified as riverine, upper perennial, unconsolidated shore composed of cobble-gravel and sand (R3UB1/2), as well as palustrine, forested, with broad leaved deciduous vegetation that is seasonally flooded/saturated (PFO1E). These areas are all depicted on the attached plan.



This is a view looking upstream towards the crossing structure.

Upland areas surrounding the stream feature forested land dominated by white pine (*Pinus strobus*), red maple (*Acer rubrum*), and paper birch (*Betula papyrifera*). The forested wetlands within the project area are dominated by red maple (*Acer rubrum*) and yellow birch (*Betula alleghaniensis*). The invasive species Japanese knotweed (*Fallopia japonica*), Japanese barberry (*Berberis thunbergii*), and multiflora rose (*Rosa multiflora*) were observed on site. The locations of these invasive species are depicted on the attached plan.

An annotated function and value assessment was performed for this site using the Army Corps Highway Methodology. It was determined that this system exhibits the following functions: floodflow alteration, fish habitat, production export, sediment/shoreline stabilization and wildlife habitat. Floodflow alteration and sediment/shoreline stabilization are very high in this system due to the very large amount of floodplain wetland. Fish habitat is greater in this river compared to the smaller streams due to deeper water allowing for a wider variety of fish species. This system also exhibits high recreational value due to its large size making it viable for activities such as canoeing, swimming and fishing. The Pemigewasset River is a designated river, meaning it is an outstanding natural and cultural resource in the State of New Hampshire.

PHOTO LOG

Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 29: This is a view of the inlet of the crossing structure at site 8.



PHOTO 30: This is a view of the outlet of the crossing structure at site 8.



PHOTO LOG

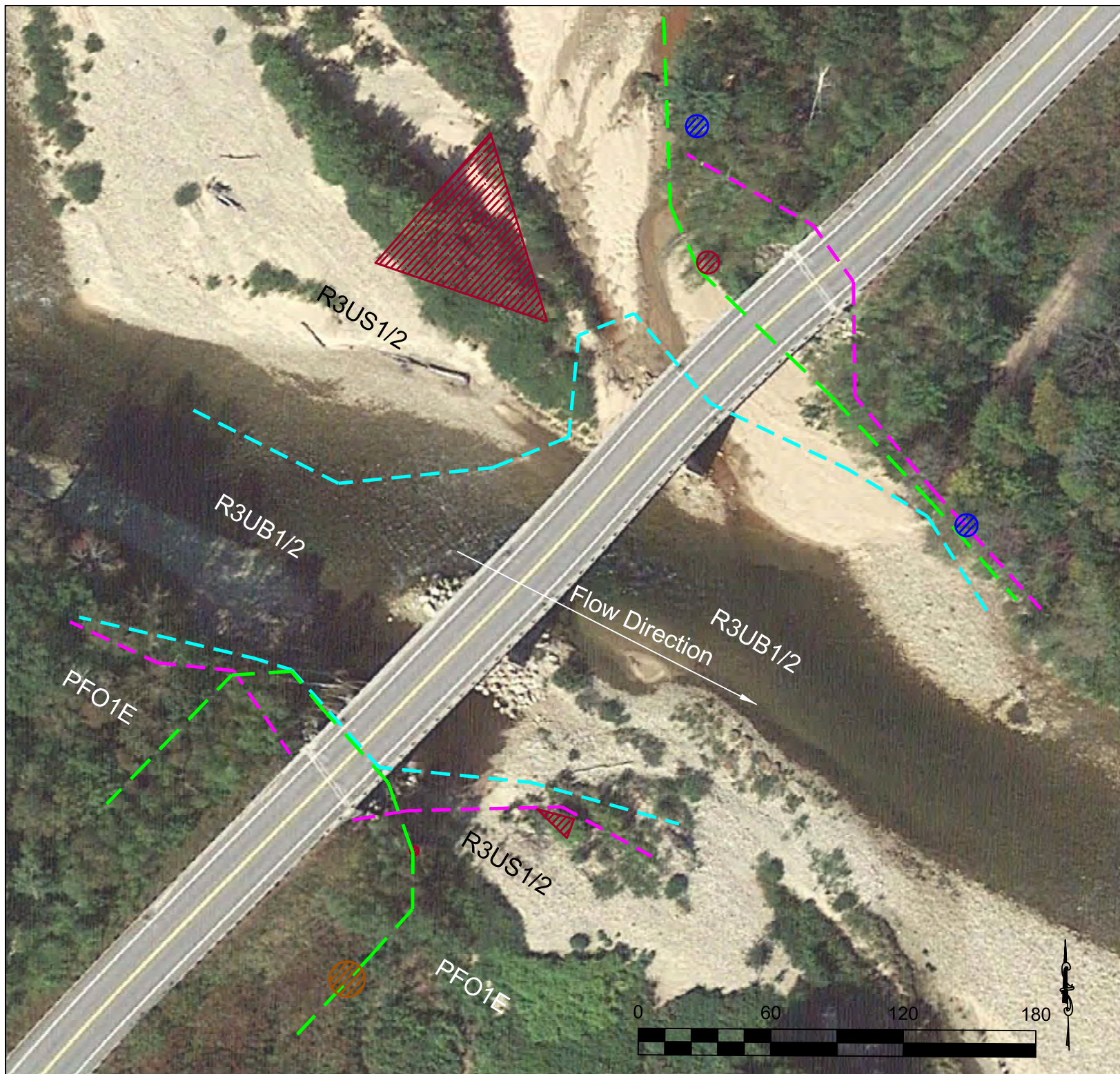
Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 31: This is a view looking downstream away from the crossing structure at site 8.



PHOTO 32: This is a view looking upstream away from the crossing structure at site 8.





Legend

- Top of Bank
- Edge of Jurisdictional Wetland
- Ordinary High Water Mark
- / / / Japanese Knotweed
- / / / Japanese Barberry
- / / / Multiflora Rose

Plan Notes

- All points were located using a GPS unit with sub-meter resolution.
- Jurisdictional wetlands on site were delineated by Stoney Ridge Environmental LLC on 5/16/2019
- Aerial image is from 2013, fluvial geomorphology has likely caused changes in the stream channel, causing the delineated lines to appear skewed.

Existing Conditions Site 8 - Eastside Road Woodstock, NH



229 Prospect Mountain Road
Phone: 603-776-5825
Fax: 603-776-5826
www.stoneyridgeenv.com

Site 9

Site 9 is a stream crossing located on Route 93 in Woodstock, New Hampshire on Eastman Brook. This crossing is a large four sided double chambered box structure. SRE performed the delineation approximately 85-125 feet up and downstream of the crossing. The stream is classified as riverine, upper perennial with an unconsolidated bottom composed of cobble-gravel and sand (R3UB1/2). It is a shallow, fast moving stream that flows west in the project area. There are jurisdictional wetlands adjacent to this stream, which are classified as riverine, upper perennial, unconsolidated shore composed of cobble-gravel and sand (R3US1/2), as well as palustrine, forested, with broad leaved deciduous vegetation that is seasonally flooded/saturated (PFO1E). There is a floodplain wetland in the southeastern portion of the project area that is classified as palustrine, forested, with broad leaved deciduous vegetation that is intermittently flooded (PFO1J). These areas are depicted on the attached plan.



This is a view looking upstream towards the crossing structure.

The upland areas surrounding the stream are dominated by paper birch (*Betula papyrifera*), white pine (*Pinus strobus*), yellow birch (*Betula alleghaniensis*) and eastern hemlock (*Tsuga canadensis*). The forested wetlands in the project area are dominated by eastern hemlock (*Tsuga canadensis*) and yellow birch (*Betula alleghaniensis*). The floodplain wetland is dominated by the same plant species as the upland areas. The invasive species Japanese barberry (*Berberis thunbergii*) was observed within the project area. The location of this invasive species is depicted on the attached plan.

An annotated function and value assessment was performed for this site using the Army Corps Highway Methodology. It was determined that this system exhibits the following functions: floodflow alteration, fish habitat, production export, sediment/shoreline stabilization and wildlife habitat. Floodflow alteration and sediment/shoreline stabilization are very high due to the very large floodplain wetland present.

PHOTO LOG

Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 33: This is a view of the inlet of the crossing structure at site 9.



PHOTO 34: This is a view of the outlet of the crossing structure at site 9.



PHOTO LOG

Statewide Scour Project
Northern New Hampshire
Photos Taken: May 14-16, 2019

PHOTO 35: This is a view looking upstream away from the crossing structure at site 9.

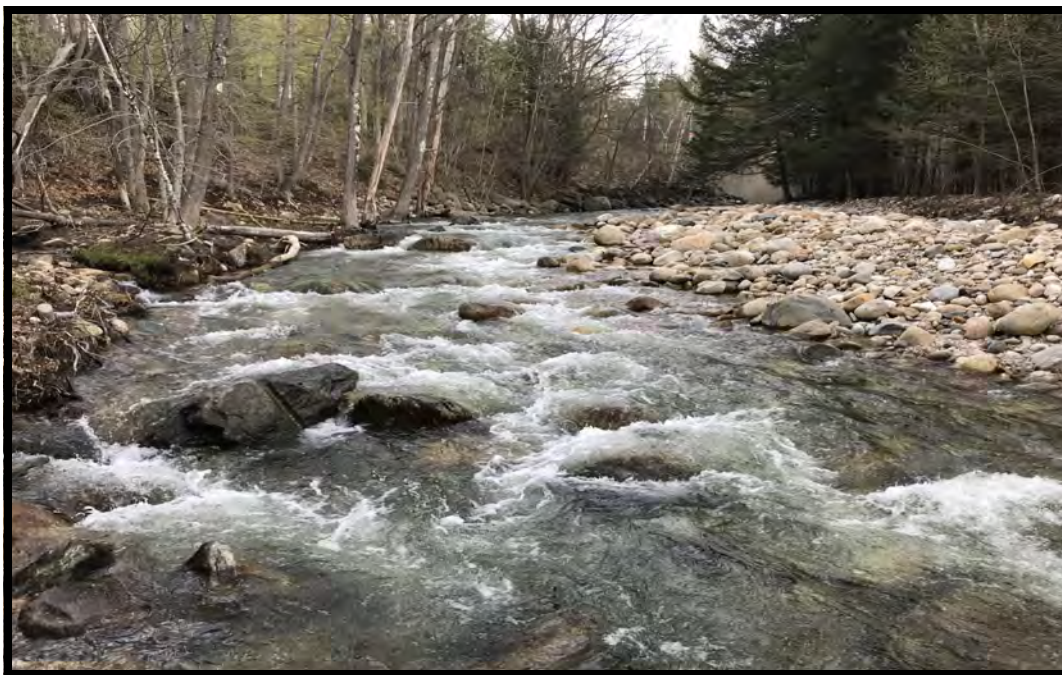



PHOTO 36: This is a view looking downstream away from the crossing structure at site 9.





Legend

- Top of Bank
- Edge of Jurisdictional Wetland
- Ordinary High Water Mark
- Change in Classification
-  Japanese Barberry

Plan Notes

All points were located using a GPS unit with sub-meter resolution. Jurisdictional wetlands on site were delineated by Stoney Ridge Environmental LLC on 5/16/2019

Existing Conditions Site 9 - Route 93 Woodstock, NH



233 Prospect Mountain Road
Phone: 603-776-5825
Fax: 603-776-5826
www.stoneyridgeenv.com

Conclusion

In conclusion, SRE visited 9 stream crossing sites across northern New Hampshire as part of the Statewide Scour Project. At each site, SRE delineated the edge of jurisdictional wetlands, as well as the ordinary high water mark and top of bank. SRE also delineated the extent of any invasive species observed on site. All points were GPS located and overlaid onto aerial imagery. A plan for each site was created depicting each of the delineated lines, the classification of each system, and the location of any invasive species. An annotated scaled down function and value assessment was performed for each site, and the results are summarized in this report.

This completes the delineation and invasive species report for the 9 sites located in the towns of Dorchester, Easton, Landaff, Lyme, Rumney, Thornton, and Woodstock. Please feel free to contact our office at 603-776-5825 with any questions.

Supplemental Color Photos

**NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES
WETLAND PERMIT APPLICATION
for
Scour Stabilization of Bridge 203/079 – Interstate 93 over Eastman Brook
Woodstock, NH
Supplemental Color Photographs**



Photo 1: Outlet Side Looking Upstream - 7/17/2018



Photo 2: Outlet Side Looking Upstream - 7/17/2018

**NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES
WETLAND PERMIT APPLICATION
for
Scour Stabilization of Bridge 203/079 – Interstate 93 over Eastman Brook
Woodstock, NH
Supplemental Color Photographs**



Photo 3: Outlet Side View of Existing RipRap on NW Wing - 7/17/2018



Photo 4: Outlet Side View of Existing RipRap on SW Wing - 7/17/2018

**NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES
WETLAND PERMIT APPLICATION
for
Scour Stabilization of Bridge 203/079 – Interstate 93 over Eastman Brook
Woodstock, NH
Supplemental Color Photographs**



Photo 5: Inlet Side View of Existing RipRap on NE Wing - 7/17/2018



Photo 6: Inlet Side View of Existing RipRap on SE Wing - 11/13/2019

Construction Sequence

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES
WETLAND PERMIT APPLICATION
for
Scour Stabilization of Bridge 203/079 – Interstate 93 over Eastman Brook
Woodstock, NH

Proposed Construction Sequence

1. Install traffic control signage and concrete barriers as needed for construction access. No lane closures will be necessary, but occasional traffic control will be necessary as construction vehicles enter and leave construction access roads.
2. Install temporary erosion control measures as detailed in the Stormwater Pollution Prevention Plan.
3. Construct access to the bridge site with a temporary road.
4. Construct approved Contractor detailed stone causeway and water diversion structure(s) within the wetland impact areas- all work will be conducted in the dry by alternating flow through one side of the channel, then the other as work is completed. Access for the upstream water diversion will be made through one barrel of the culvert.
5. Water diversion structure(s) will be designed to withstand storms during construction. It is anticipated that the water diversion structure will consist of a pipe just downstream of the culvert that can be partially filled over to allow contractor access to the work area across the brook from the access road. It is common practice for the contractor to keep an eye on the weather and to stabilize and adjust the water diversion capacity as needed. Further details regarding the water diversion structures can be found in the Stormwater Pollution Prevention Plan, and any changes are noted with this living document.
6. Excavate to the limits and elevations shown on the plans or as directed by the Engineer necessary to install the scour countermeasures within the channel, banks, and scour hole. Excavated materials will be deposited into construction hauling equipment for removal, proper treatment, and disposal as detailed in the Stormwater Pollution Prevention Plan.
7. Install scour countermeasures consisting of a 12" thick layer of bedding material, Concrete Armor Matrix Components (5'x5'x5' A-Jack Modules) with Item 540.34 Scour Countermeasure Bedding Material (meeting gradation requirements of Item 304.6 Crushed Stone [Very Course]) on top to fill in voids and embed the A-jack modules to full height, and Class IX riprap along the banks to the limits shown on the plans.
8. Place natural streambed (excavated material) on top of the last 20 feet of the A-jack modules once they are completely filled with the bedding material as shown on the plans.
9. Remove water diversion structure(s) and stone causeway allowing the brook to flow through the bridge opening.
10. Remove temporary access road.
11. Stabilize disturbed access road areas and roadway slopes by loaming, seeding and installing erosion control matting as needed.
12. Remove temporary erosion control measures once stabilized.

Stone causeway and water diversion structure(s) will remain in-place for approximately one month until the scour countermeasures are installed and they are no longer required by the Contractor's means and methods to complete the work. The entire duration of construction is expected to be approximately one month.

Riprap And Stone Infill Specifications

DIVISION 300 -- BASE COURSES

*SECTION 304 -- AGGREGATE BASE COURSE***Description**

1.1 This work shall consist of furnishing and placing base courses on a previously prepared subgrade or course as shown on the plans or as ordered.

1.2 This work shall also include raising the grade of the edge of the roadway shoulders with crushed aggregate as shown on the plans or as ordered to match the grade of the pavement course placed on the shoulders or to provide a base for shoulder pavement.

Materials**2.1 General.**

2.1.1 The materials shall consist of hard, durable particles or fragments of stone or gravel. Materials that break up when alternately frozen and thawed or wetted and dried shall not be used for aggregate base course materials. Fine particles shall consist of natural or processed sand. The materials shall be free of harmful amounts of organic material. Unless otherwise specified, the percent wear of base course material shall not exceed 50 percent as determined by AASHTO T 96, Grading A.

2.1.2 Crushed stone shall be processed material obtained from a source that has been stripped of all overburden. The processed material shall consist of clean, durable fragments of ledge rock of uniform quality and reasonably free of thin or elongated pieces.

2.1.3 Materials for glass cullet shall either be separated/recyclables received from a recycling facility permitted (pursuant to RSA 149-M:10) by the Waste Management Division of the Department of Environmental Services and/or materials certified for Direct Re-Use in accordance with Env-Sw 1500.

2.1.3.1 Glass cullet shall meet the requirements of AASHTO M318.

2.2 Gradation. The required gradation of base course material shall conform to [Table 304-1](#).

2.3 Sand. The maximum size of any stone or fragment shall not exceed three-fourths of the compacted depth of the layer being placed but in no case larger than 6".

2.4 Gravel. The maximum size of stone particles shall not exceed three-fourths of the compacted thickness of the layer being placed but in no case larger than 6".

2.5 Crushed gravel. At least 50 percent of the material retained on the 1" sieve shall have a fractured face.

2.6 Crushed gravel for shoulder leveling. This material shall consist either of a crushed aggregate, or a blend of crushed aggregate and reclaimed asphalt or concrete materials. Reclaimed Asphalt Pavement (RAP) and/or Reclaimed Concrete Aggregate (RCA) may be blended up to 75% by volume with the crushed aggregate. The crushed aggregate shall meet the gradation requirements of Item 304.32 in [Table 304-1](#) prior to blending with reclaimed materials. The reclaimed materials shall meet the requirements of 2.6.1 or 2.6.2 as applicable prior to blending with crushed aggregate.

2.6.1 RAP for this purpose shall be processed by either crushing or screening such that 100% of the material passes the 1" sieve. Screening will only be allowed if the source of the RAP is pavement millings from cold planning bituminous surfaces.

2.6.2 RCA shall meet the requirements of AASHTO M 319, except for its gradation requirements. 100% of the material shall pass the 1" sieve.

2.7 Crushed aggregate for shoulders. This material shall meet the gradation requirements of [Table 304-1](#).

2.8 Gravel for drives. The material shall meet the requirements of gravel as shown in [Table 304-1](#).

2.9 Crushed gravel for drives. The material shall meet the gradation requirements of either crushed gravel or crushed stone (fine) as shown in [Table 304-1](#).

2.10 Crushed stone base course (fine gradation). Acceptable sand may be blended as necessary to obtain the proper gradation for the fine aggregate portion.

Table 304-1 - Base Course Materials Required Gradation

Item No.	304.1	304.2	304.3	304.32	304.33	304.4	304.5	304.6
Item	Sand	Gravel	Crushed Gravel	Crushed Gravel for Shoulder Leveling	Crushed Aggregate for Shoulders	Crushed Stone (Fine)	Crushed Stone (Coarse)	Crushed Stone (Very Coarse)
Sieve Size	Percent Passing By Weight							
6"	100	100	---	---	---	---	---	100
5"	---	---	---	---	---	---	---	---
4"	---	---	---	---	---	---	---	---
3 1/2"	---	---	---	---	---	---	100	---
3"	---	---	100	---	---	---	85 – 100	60-90
2 1/2"	---	---	---	---	---	---	---	---
2"	---	---	95 – 100	---	---	100	---	---
1 1/2"	---	---	---	100	100	85 – 100	60 – 90	45-75
1"	---	---	55 – 85	90-100	90 – 100	---	---	---
3/4"	---	---	---	---	---	45 – 75	40 – 70	35-65
1/2"	---	---	---	65-90	---	---	---	---
#4	70 – 100	25 – 70	27 – 52	30-55	30 – 65	10 – 45	15 – 40	15-40
# 200 (In Sand Portion)*	0 – 12	0 – 12	0 – 12	---	---	---	---	---
# 200 (In Total Sample)	---	---	---	0-10	0 – 10	0 – 5	0 – 5	0-5

* Fraction passing the # 4 sieve

2.11 Crushed stone base course (coarse gradation). Acceptable sand may be blended as necessary to obtain the proper gradation for the fine aggregate portion.

2.11.1 The substitution of crushed stone meeting the requirements of crushed stone base course (fine gradation) for all or part of this item will be permitted.

Construction Requirements

3.1 General.

3.1.1 Upon approval, base course materials found within the project limits may be used under the specific item in accordance with 104.04.

3.1.2 Gravel or approved substitution for gravel may be substituted for any sand course. Crushed gravel may be substituted for gravel. Substitutions must be made across the entire section and will not be allowed for short or discontinuous segments.

3.1.3 Crushed stone (fine gradation) may be substituted for crushed gravel provided there is a minimum of 1 ft. of free draining material (sand, gravel, crushed stone coarse, or crushed stone very coarse) below the crushed stone. The substitution must be made across the entire section at a constant depth and will not be allowed for short or discontinuous segments.

3.1.4 Permission may be granted to use the following recycled materials in lieu of crushed gravel or crushed stone (fine gradation) provided the following requirements are met:

- (a) Free draining material exists below the replacement material as described in 3.1.3.
- (b) Substituted materials must come from a homogenous stockpile that meets the gradation requirements of the material being replaced.
- (c) Transitions between replacement material and crushed gravel or crushed stone (fine gradation) shall be made using a 50 ft. taper.
- (d) The material shall be placed directly under the proposed pavement.

3.1.4.1 Reclaimed asphalt pavement, blended with granular material, shall be tested in accordance with NHDOT test method S1.

3.1.4.2 Reclaimed concrete aggregate shall also meet the requirements of AASHTO M 319, except for the gradation requirements. The material shall contain no more than 5 percent reclaimed asphalt pavement.

3.1.5 Crushed stone (coarse or very coarse) may be substituted for gravel provided that all crushed gravel above the crushed stone is replaced with a combination of crushed stone coarse and fine with the top layer consisting of a minimum of 6" of crushed stone fine. The substitution must be made across the entire section and will not be allowed for short or discontinuous segments.

3.1.6 Crushed aggregate base course materials shall be produced and placed in their final location with as little segregation as possible.

3.1.7 Excess reclaimed stabilized base material substantially meeting the requirements of 2.7 may be substituted for the crushed aggregate for shoulders in 2.6. Reclaimed stabilized base material shall be mixed with loam as specified in 2.6.

3.1.7.1 Reclaimed stabilized base material shall not be substituted for crushed aggregate for shoulders in areas contiguous to residences and other existing landscaped areas where the growth of grass is desired.

3.2 Aggregate Crushing Plant.

3.2.1 The equipment for producing crushed gravel shall be of adequate size and with sufficient adjustments to produce the required materials without unnecessary waste. The plant shall be capable of removing excess fines.

3.2.2 The equipment for producing crushed stone shall consist of sufficient units with sufficient adjustments to produce the required material. The plant shall be capable of removing undesirable material and excess fines. In order to meet the required gradation, the Contractor may produce acceptable material in one operation or combine coarse and fine piles through a proportioning hopper to create a combined stockpile.

3.2.3 Glass Cullet Crushing Plant. The glass cullet crushing plant shall be capable of producing a product meeting the gradation requirements of AASHTO M 318.

3.2.3.1 Glass cullet shall be thoroughly mixed with other base course materials to produce a homogeneous blend prior to being placed on the roadway. In-place field blending of glass cullet with other base course materials will not be permitted, unless otherwise permitted.

3.3 Stockpile Construction.

3.3.1 All crushed aggregate base course materials shall be stockpiled. The Contractor shall give the Engineer advance notification of when the manufacturing and stockpiling are to begin.

3.3.2 A stockpile of acceptable material, as described in 3.5, equal to at least 20 percent of the bid quantity or 5,000 cy, whichever is less, shall be constructed before the hauling and placing phase of the work begins. The stockpile shall be maintained until approximately 80 percent of the quantity has been placed.

3.3.3 Stockpiles shall be constructed in layers that minimize segregation. The desired optimum thickness of layers is 6 ft. and in no instance shall the layer be more than 10 ft. Each layer shall be completed before the next layer is started. Construction of stockpiles by direct use of a fixed conveyor belt system or by dumping over a bank will not be permitted.

3.4 Placing.

3.4.1 The subgrade or preceding course shall be shaped to the specified crown and grade and maintained in a smooth condition free of holes and ruts. If the hauling equipment causes ruts in the subgrade or previously placed base course, the equipment shall be operated only on the course being placed, behind the spreading equipment.

3.4.2 Care shall be taken to avoid segregation during placement. Base course material shall be dumped on the course being placed and spread at once onto the previously placed layer. If spreading equipment is not available, dumping will not be permitted. Any segregation that occurs shall be remedied or the materials removed and replaced at no additional cost to the Department.

3.4.3 The Contractor's method of operation shall be such that oversized stones will not be delivered to the project.

3.4.4 When the base course is to be surface-treated and no pavement is to be placed upon it, stones having any dimension greater than 3" shall be removed from the upper 4" of the top layer.

3.4.5 Prior to fine grading, hard spots in the surface of the top layer shall be eliminated by scarifying the top 4" .

3.4.6 Crushed gravel for shoulder leveling shall be spread uniformly along the area adjoining the edge of the pavement. The material shall be spread along both sides and under guardrail where there is no curb.

3.4.6.1 Reclaimed stabilized base material utilized in shoulders greater than 1-1/2", in any direction, shall not be exposed after placement.

SECTION 304

3.4.7 To prevent segregation of crushed aggregate during spreading and to assist in obtaining the required density of the mixture, water may be added to the crushed aggregate prior to performing the grading operations. The course shall be maintained in the moist condition during grading operations.

3.4.8 Crushed aggregate shall be hauled from an approved stockpile. Material obtained directly from a conveyor shall not be placed on the roadway without first stockpiling.

3.4.9 The base course material shall be spread in the amount necessary for proper consolidation and shall be shaped true to grade and cross-section by means of power graders or other approved equipment.

3.4.10 Surface voids in crushed stone base course (fine gradation) shall be eliminated by the addition of filler material to just fill the voids. Any surplus filler material shall be removed. The finished surface shall be uniform, true to grade, and free from segregation. The Contractor shall furnish and place filler material to correct any visible segregation prior to paving. The filler material shall be spread, scarified, if required, into the course, and recompact to the required density. Filler material shall meet the gradation requirements of sand. The final gradation of crushed stone base course (fine gradation) shall meet the requirements of Table 304-1.

3.5 Testing For Gradation.

3.5.1 Sampling procedure shall conform to AASHTO T 2. Testing procedures shall be in accordance with AASHTO T 27.

3.5.1.1 When reclaimed asphalt pavement is blended with granular material to be used in lieu of crushed gravel or crushed stone base course (fine gradation) the method used to determine the amount of coarse material shall be determined according to NHDOT S-1.

3.5.2 The amount of material finer than the No. 200 sieve shall be determined according to AASHTO T 11, which specifies dry sieving after washing.

3.5.2.1 When reclaimed asphalt pavement is blended with granular material to be used in lieu of crushed gravel or crushed stone base course (fine gradation) the method used to determine the amount of material finer than the No. 200 sieve shall be determined according to NHDOT S-1.

3.5.3 For a preliminary determination of compliance with the specification for gradation, samples of sand and gravel may be taken from the pit, and samples of crushed gravel and crushed aggregate may be taken from the stockpile or from the final phase of the crushing operation. Materials not meeting the gradation requirements shall not be placed on the roadway

3.5.4 Samples for acceptance testing of the material in place will be taken from each lift. Sampling for acceptance testing will not be done until the material has been graded and compacted.

3.5.5 Previously tested and accepted material contaminated by earthen, organic, or other foreign matter or degraded by hauling equipment to such an extent that the material no longer meets the gradation requirements shall be removed and replaced or otherwise made acceptable at the Contractor's expense.

3.6 Compaction.

3.6.1 Unless shown on the plans or ordered otherwise, the compacted depth of sand courses shall not exceed 12". The compacted depth of any layer of gravel, crushed gravel, or crushed stone placed shall not exceed 8".

3.6.2 Compaction of base course material shall be done with a method and adequate water to meet the requirements of 3.7. Rolling and shaping shall continue until the required density is attained.

3.6.3 Rolling and shaping patterns shall begin on the lower side and progress to the higher side of the course while lapping the roller passes parallel to the centerline. Rolling and shaping shall continue until each layer conforms to the required grade and cross-section and the surface is smooth and uniform.

3.6.4 Water shall be uniformly applied over the base course materials during compaction in the amount necessary for proper consolidation.

3.6.5 When vibratory equipment is being operated, the amplitude of vibrations, the compaction process shall be adjusted as necessary to avoid causing damage or vibration complaints to adjacent buildings and property.

3.6.6 Except at inaccessible locations, such as near guardrail, material used for shoulder leveling shall be set with a pneumatic-tired roller.

3.7 Density Testing.

3.7.1 The density of sand courses shall be determined by AASHTO T 191 (Sand-Cone Method), AASHTO T 204 (Dry-Cylinder Method), or AASHTO T 310 (Nuclear Methods). The density shall not be less than 95 percent of the maximum density determined in accordance with AASHTO T 99 (Standard Proctor Test) or a control strip per 3.8.

3.7.2 The density of gravel and crushed gravel courses shall be determined by AASHTO T 191 (Sand-Cone Method) or AASHTO T 310 (Nuclear Methods). The density of crushed stone base courses shall be determined by AASHTO T 310 (Nuclear Methods). The density shall not be less than 95 percent of the maximum density as determined by AASHTO T 99 (Standard Proctor Test) or a control strip per 3.8.

3.8 Control Strip Procedure.

3.8.1 At the beginning of the compaction operation a control strip of at least 100 linear ft. in length and spanning the width of the section being placed shall be constructed. The density requirement shall be determined by compacting the control strip at a suitable moisture content until no further increase in density can be measured. The remainder of the course shall be compacted to a density not less than 95 percent of the maximum control strip density, as measured by the nuclear density testing equipment. A new control strip will be required when there is a significant change in the gradation of the material being placed or a change in compaction equipment. Compaction of the control strip shall be done with approved vibratory rollers or compactors capable of producing a dynamic force of at least 27,000 lb.

3.8.2 Crushed gravel for roundabout truck apron curb shall be compacted to a density not less than 98 percent of the maximum control strip density, as measured by the nuclear density testing equipment.

3.9 Winter Construction.

3.9.1 Base course materials shall not be placed on or above frozen material if the depth from the top of the contemplated course to the bottom of the frozen material exceeds 2-1/2 ft.

3.9.2 If the density requirements are not attained for any layer before the material freezes, no further material shall be placed on that layer.

3.10 Maintenance of Traffic. Glass cullet base course blends shall be capped with standard specification base course materials before the traveling public is allowed to drive over the material.

Method of Measurement

4.1 Roadbed base course materials of sand, gravel, crushed gravel, crushed aggregate for shoulders, crushed stone (fine gradation), and crushed stone (coarse gradation) will not be measured, but shall be the cubic yard final pay quantity in accordance with 109.11 of compacted material required within the lines shown on the plans.

4.2 Applicable provisions as stated in 106.02 shall apply to base course materials.

4.3 Crushed gravel for shoulder leveling will be measured by the ton in accordance with 109.01.

4.3.1 Reclaimed stabilized base material used for crushed gravel for shoulder leveling shall be measured by the cubic yard using average lengths, widths and depths of the area to be filled or as provided in 4.3 as determined by the Engineer.

4.4 Gravel and crushed gravel for drives will be measured by the cubic yard of compacted materials placed within the limits shown on the plans.

Basis of Payment

5.1 Roadbed base course materials of sand, gravel, crushed gravel, crushed stone (fine gradation), and crushed stone (coarse gradation) are final pay quantities and will be paid for at the Contract unit price per cubic yard in accordance with 109.11.

5.1.1 Reclaimed stabilized base authorized for use in lieu of crushed gravel or crushed stone (fine gradation) will be paid for as provided in 5.1.

5.2 Filler material used to eliminate voids in crushed stone base course (fine gradation) will be subsidiary.

SECTION 304

5.3 The accepted quantity of gravel, crushed aggregate for shoulders or crushed gravel for drives will be paid for at the Contract unit price per cubic yard complete in place. The accepted quantity of crushed gravel for shoulder leveling will be paid for at the Contract unit price per ton delivered and used on the project.

Pay items and units:

304.1	Sand (F)	Cubic Yard
304.2	Gravel (F)	Cubic Yard
304.25	Gravel for Drives	Cubic Yard
304.3	Crushed Gravel (F)	Cubic Yard
304.32	Crushed Gravel for Shoulder Leveling	Ton
304.33	Crushed Aggregate for Shoulders	Cubic Yard
304.35	Crushed Gravel for Drives	Cubic Yard
304.4	Crushed Stone (Fine Gradation) (F)	Cubic Yard
304.5	Crushed Stone (Coarse Gradation) (F)	Cubic Yard
304.6	Crushed Stone (Very Coarse)	Cubic Yard

SECTION 583 -- RIPRAP**Description**

1.1 This work shall consist of furnishing and placing riprap as shown on the plans or ordered. Riprap is typically required for erosion protection of bridge structures in waterways, for active waterway channel slopes and bottoms, and for intermittent waterway channels where the Engineer determines riprap protection is required to resist expected high water flow velocities.

Materials

2.1 Riprap shall be quarry stone of approved quality, hard, durable, sub-angular to angular in shape, resistant to weathering and free from structural defects such as weak seams and cracks.

2.1.1 The suitable shape of the individual stones shall be angular, meeting the gradation in 2.1.1.2 to create interlocking riprap to provide stability of the slope or channel. Round, thin and platy, elongated or needle-like shapes shall not be used.

2.1.1.1 The suitable riprap stone shape is determined by the Length to Thickness ratio, where Length is the longest dimension and Thickness is the shortest dimension, measured in perpendicular axes to each other. The suitable riprap stone shape shall have a length to thickness ratio of no greater than 3.

2.1.1.2 The gradation requirements of the riprap classes in Table 583-1 are based on the stone size Width, the largest dimension perpendicular to the Length and Thickness, and the distribution of stone sizes by volume. The volume distribution requires that 15 percent of the stone in the mass shall be no larger than the volume shown in the table (< 15% column), and 15 percent of the stone in the mass shall be no smaller than the volume shown in the table (> 85% column). The remaining 70 percent of the stone in the mass shall have a volume between these requirements, averaging to the volume shown in the table (15% - 85% column). None of the stones in the mass shall exceed the maximum volume shown in the table (Maximum column).

Table 583-1

Riprap Classes and Sizes			Percentage Distribution of Particle Sizes by Volume (cubic feet)			
Class	Nominal Size (in)	Maximum Size (in)	< 15%	15% – 85%	> 85%	Maximum
I	6	12	0.05	0.14	0.31	1.0
III	12	24	0.4	1.0	2.5	6.5
V	18	36	1.3	3.5	8.5	22
VII	24	48	3	8	19	53
IX	36	72	10	27	65	179

Note: Nominal Size and Maximum Size are based on the Width dimension of the stone. The riprap classes conform to the standard classes described in the FHWA HEC-23 publication.

2.1.2 The sources from which the stone is obtained shall be selected well in advance of the time when the material will be required in the field. The acceptability of the riprap stone shape and grading will be determined by the Engineer.

2.1.3 Control of the gradation will be completed by visual inspection approval by the Engineer of a stockpile at the quarry or other agreed site. Mechanical equipment as needed to assist in checking the stockpile gradation shall be provided by the Contractor. Stockpile replenishment will require re-approval.

2.2 Gravel blanket material shall conform to [209.2.1.2](#).

2.3 Geotextile shall conform to [593.2](#).

Construction Requirements

3.1 Preparation of slopes. Slopes that will be covered by riprap shall be free of brush, trees, stumps, and other organic material and shall be graded to a smooth surface. All soft material shall be removed to the depth shown on the plans or as directed and replaced with approved material per 203.3.6. It is the Contractor's responsibility to protect embankments and excavated slopes from erosion during construction of the riprap covered slope.

3.2 Gravel blanket construction. When called for on the plans, the gravel blanket shall be placed on the prepared area to the specified thickness in one operation, using methods which will not cause segregation of particle sizes within the layer. The surface of the finished layer shall be even and free from mounds or windrows.

3.3 Geotextile placement. Geotextile shall be placed in accordance with [593.3](#).

3.4 Riprap placement. Riprap shall be constructed to the dimensions shown on the plans or as directed by the Engineer.

3.4.1 Placement of riprap shall be conducted as soon as possible after gravel blanket or geotextile placement.

3.4.2 Placement of the riprap shall be started at the toe (key trench) and progress up the slope. The key trench at the bottom of the riprap shall be constructed as shown on the plans. If bedrock is encountered at the key trench it shall be brought to the attention of the Engineer to determine if modification to the riprap installation is needed.

3.4.3 Riprap shall be placed over geotextile by methods that do not stretch, tear, puncture or reposition the fabric. Riprap smaller than 1.5 cu. ft. in volume shall be placed with drop heights of less than 3 ft. to the placement surface. Riprap greater than 1.5 cu. ft. in volume shall be placed with no free fall height.

3.4.4 Equipment such as a clamshell, orange-peel bucket, skip or hydraulic excavator shall be used to place the riprap so it is well distributed and there are no large accumulations of either the larger or smaller sizes of stone. Dump trucks or front-end loaders tracked or wheeled vehicles shall not be used since they can destroy the interlocking integrity of the stone when driven over previously placed riprap. Placing the riprap by end dumping on the slopes will cause segregation and will not be permitted.

3.4.5 The riprap shall be placed in a manner which produces a well-graded mass. The larger stones shall be well distributed and the entire mass of riprap shall conform approximately to the gradation specified. Hand placing or rearranging of individual stones by mechanical equipment may be required to the extent necessary to secure the uniformity of gradation and surface specified. Fill voids between larger stones with small stones to ensure interlocking between the riprap.

3.4.6 After the riprap is in place, it shall be compacted by impacting (ramming) the exposed surface to produce a tight, locked surface, not varying more than 6" from the elevations shown on the plans.

3.4.7 Riprap placed in water requires close observation and increased quality control to ensure the required thickness, gradation and coverage is achieved.

Method of Measurement

4.1 Riprap will be measured by the cubic yard.

4.1.1 If the Engineer determines that in-place measurement is impracticable, the quantity for payment will be determined by loose measure in the hauling vehicle on the basis that 1 cubic yard vehicle measure is equivalent to 0.7 cubic yard in place.

Basis of Payment

5.1 The accepted quantity of riprap will be paid for at the Contract unit price per cubic yard (cubic meter) complete in place.

5.1.1 Only when the stone is examined in accordance with 2.1 and examination proves the gradation to be acceptable will payment be made as provided in [109.04](#).

5.1.2 Gravel blanket material specified or ordered will be paid for under [Section 209](#).

5.1.3 Geotextile specified or ordered will be paid for under [Section 593](#).

5.1.4 The accepted quantity of excavation required for placing riprap and for placing any underlying gravel blanket will be paid for under the item of excavation being performed. Excavation above refers only to excavation of original ground or to material ordered removed not shown on the plans.

5.1.5 Free borrow will not be required to replace the accepted quantity of stone obtained from the excavation. However, when the plans do not call for borrow but the quantity of material removed from excavation for use under this item requires the Contractor to furnish borrow to complete the work, such borrow will be subsidiary.

5.1.6 Replacement slope material resulting from the requirements of 3.1 will be paid in accordance with [203.5.1.9](#).

Pay item and unit:

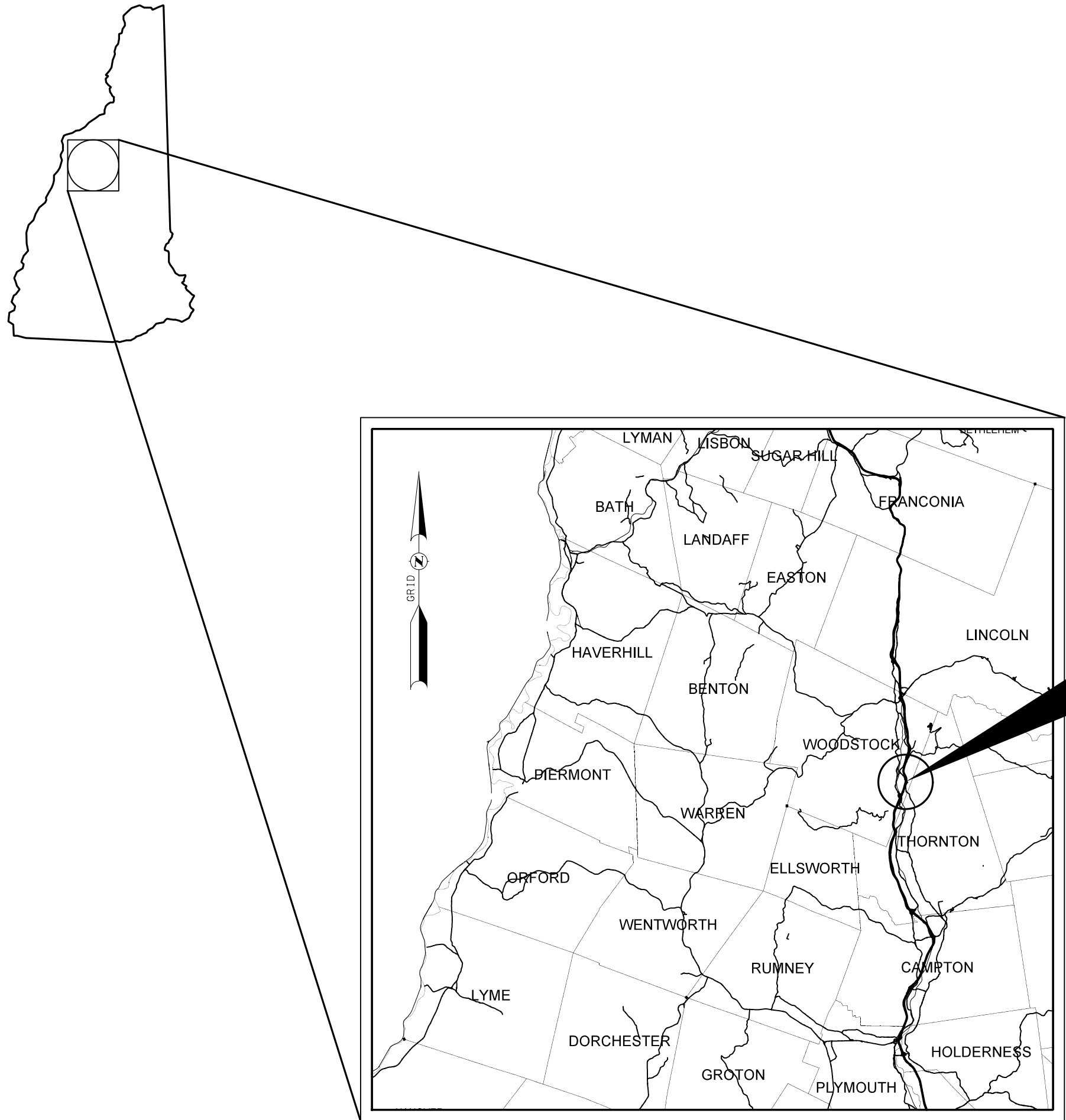
583.1	Riprap, Class I	Cubic Yard
583.3	Riprap, Class III	Cubic Yard
583.5	Riprap, Class V	Cubic Yard
583.7	Riprap, Class VII	Cubic Yard
583.9	Riprap, Class IX	Cubic Yard

Project Plans

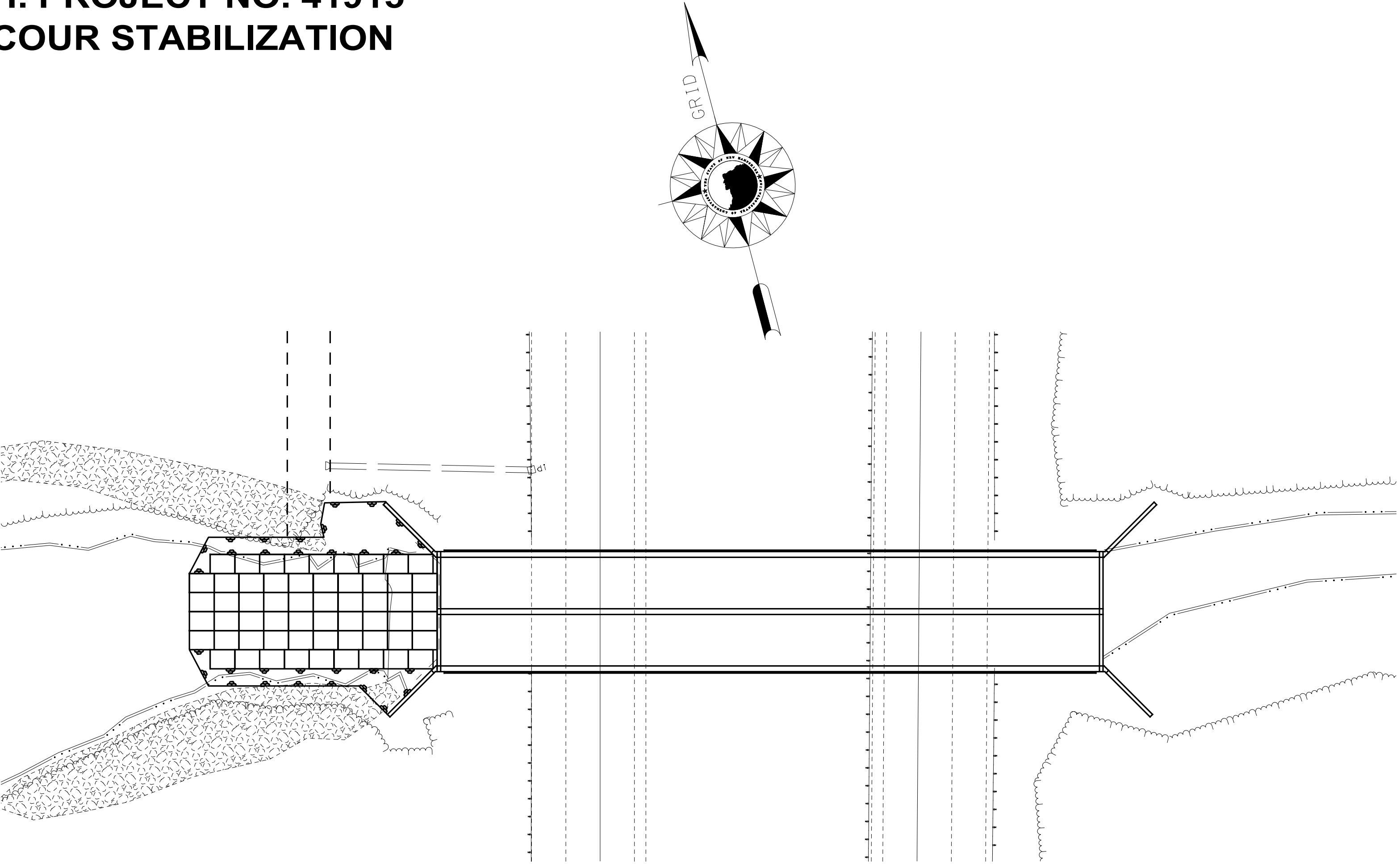
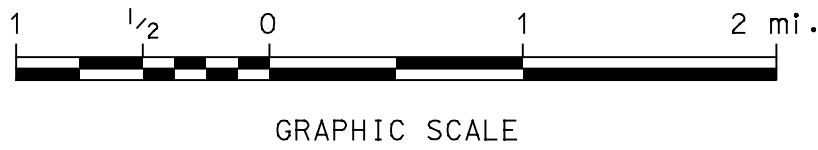
STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
WETLANDS PLANS
FEDERAL AID PROJECT

X-A004(779)
N.H. PROJECT NO. 41915
SCOUR STABILIZATION

STONEY RIDGE ENVIRONMENTAL, LLC, PERFORMED
THE WETLAND IDENTIFICATION AND DELINEATION ON
MAY 14,15 AND 16, 2019 ACCORDING TO THE CORPS OF
ENGINEERS WETLAND DELINEATION MANUAL AND THE
REGIONAL SUPPLEMENT TO THE CORPS OF
ENGINEERS WETLAND DELINEATION MANUAL:
NORTHCENTRAL AND NORTHEAST REGION, VERSION
2.0, JANUARY 2012, US ARMY CORPS OF ENGINEERS.



LOCATION MAP



TOWN OF WOODSTOCK

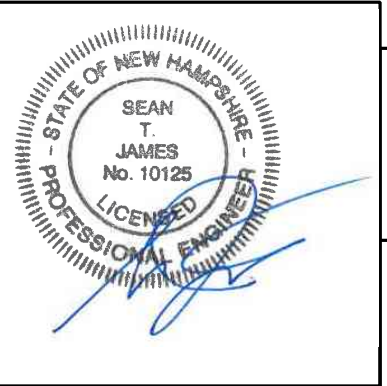
COUNTY OF GRAFTON

SCALE: 1" = 30'

FOR CONSTRUCTION AND ALIGNMENT DETAILS -
SEE CONSTRUCTION PLANS

INDEX OF SHEETS

- 1 FRONT SHEET
- 2-3 STANDARD SYMBOLS SHEETS
- 4 EROSION CONTROL STRATEGIES AND STABILIZATION MATRIX
- 5 WETLAND IMPACTS PLAN - WOODSTOCK BR NO. 203/079
- 6 DETAILS



Hoyle, Tanner
& Associates, Inc.

NHDOT THE STATE OF
NEW HAMPSHIRE
DEPARTMENT OF
TRANSPORTATION

RECOMMENDED FOR APPROVAL:

DIRECTOR OF PROJECT DEVELOPMENT DATE

APPROVED:

ASSISTANT COMMISSIONER AND CHIEF ENGINEER DATE

DRAWING NAME	DRAWING NAME	FEDERAL PROJECT NO.	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
092590_18	41915FSC	X-A004(779)	41915	1	6

DRAWN BY TAG DATE 7/7/20
CHECKED BY EGV DATE 7/7/20

GENERAL

EDGE OF PAVEMENT
TRAVELED WAY

PROPOSED ROADWAY

existing roadway

(pavement removed outside slope lines)

DRIVEWAYS

(label surface type)

BUILDINGS

(label house or type of building)

FOUNDATION

(label type)

LEACH FIELD

leach field

BRIDGE CROSSINGS

STREAM

OVERPASS

STEPS AND WALK

(label type)

INTERMITTENT WATER COURSE

SHORE LINE

river/stream

pond (label name of water body)

POTENTIAL WET AREA SYMBOL

BRUSH OR WOODS LINE

(deciduous)(coniferous) (stump)

TREES (PLANS)

(show station, circumference in feet & type)

TREE OR STUMP (CROSS-SECTIONS)

HEDGE

(label type)

MONITORING WELL

mon

WELL

W

FLAG POLE

fp

ORIGINAL GROUND (TYPICALS)

ROCK OUTCROP

ROCK LINE (TYPICALS & SECTIONS ONLY)

GUARDRAIL (label type)

JERSEY BARRIER

CURB (LABEL TYPE)

STONE WALL

RETAINING WALL (LABEL TYPE)

FENCE (LABEL TYPE)

SIGNS

(single post)

(double post)

GAS PUMP

FUEL TANK (ABOVE GROUND)

STORAGE TANK FILLER CAP

SEPTIC TANK

GRAVE

MAILBOX

VENT PIPE

SATELLITE DISH ANTENNA

PHONE

GROUND LIGHT/LAMP POST

BORING LOCATION

TEST PIT

INTERSTATE NUMBERED HIGHWAY

UNITED STATES NUMBERED HIGHWAY

STATE NUMBERED HIGHWAY

SHORELAND - WETLAND

WETLAND DESIGNATION AND TYPE

DELINEATED WETLAND

ORDINARY HIGH WATER

TOP OF BANK

TOP OF BANK & ORDINARY HIGH WATER

NORMAL HIGH WATER

WIDTH AT BANK FULL

PRIME WETLAND

PRIME WETLAND 100' BUFFER

NON-JURISDICTIONAL DRAINAGE AREA

COWARDIN DISTINCTION LINE

TIDAL BUFFER ZONE

DEVELOPED TIDAL BUFFER ZONE

HIGHEST OBSERVABLE TIDE LINE

MEAN HIGH WATER

MEAN LOW WATER

VERNAL POOL

SPECIAL AQUATIC SITE

REFERENCE LINE

WATER FRONT BUFFER

NATURAL WOODLAND BUFFER

PROTECTED SHORELAND

INVASIVE SPECIES LABEL

INVASIVE SPECIES

FLOODPLAIN / FLOODWAY

500 YEAR FLOODPLAIN BOUNDARY

100 YEAR FLOODPLAIN BOUNDARY

FLOODWAY

ENGINEERING

CONSTRUCTION BASELINE

PC, PT, POT (ON CONST BASELINE)

PI (IN CONSTRUCTION BASELINES)

INTERSECTION OR EQUATION OF TWO LINES

ORIGINAL GROUND LINE (PROFILES AND CROSS-SECTIONS)

PROFILE GRADE LINE (PROFILES AND CROSS-SECTIONS)

CLEARING LINE

SLOPE LINE

SLOPE LINE (FILL)

SLOPE LINE (CUT)

PROFILES AND CROSS SECTIONS:

ORIGINAL GROUND ELEVATION (LEFT)

FINISHED GRADE ELEVATION (RIGHT)

DRAINAGE

MANHOLE

CATCH BASIN

DROP INLET

DRAINAGE PIPE (existing)

DRAINAGE PIPE (PROPOSED)

UNDERDRAIN (existing)
W/ FLUSHING BASIN

UNDERDRAIN (PROPOSED)
W/ FLUSHING BASIN

HEADER (existing & PROPOSED)

END SECTION (existing & PROPOSED)

OPEN DITCH (PROPOSED)

EROSION CONTROL/ STONE
SLOPE PROTECTION

(existing)

(PROPOSED)

show
direction
of flow

(label size
& type)

(label size
& type)

(with stone outlet
protection)

METAL or PLASTIC

RCP

BOUNDARIES / RIGHT-OF-WAY

	(label type)
RIGHT-OF-WAY LINE	— — — — —
RR RIGHT-OF-WAY LINE	— — — — —
PROPERTY LINE	— — — — —
PROPERTY LINE (COMMON OWNER)	— — — — —
TOWN LINE	— — — — — BOW CONCORD
COUNTY LINE	— — — — — COOS GRAFTON
STATE LINE	— — — — — MAINE NEW HAMPSHIRE
NATIONAL FOREST	— — — — —
CONSERVATION LAND	— — — — —
BENCH MARK / SURVEY DISK	— — — — —
BOUND	□ (PROPOSED)
STATE LINE/ TOWN LINE MONUMENT	□ S/L □ T/L
NHDOT PROJECT MARKER	△
IRON PIPE OR PIN	• ip
DRILL HOLE IN ROCK	• dh
TAX MAP AND LOT NUMBER	156 14 1642/341 6.80 Ac. ±
PROPERTY PARCEL NUMBER	12
HISTORIC PROPERTY	H









UTILITIES

	existing	PROPOSED
TELEPHONE POLE		
POWER POLE		
JOINT OCCUPANCY		
MISCELLANEOUS/UNKNOWN POLE		
GUY POLE OR PUSH BRACE		
LIGHT POLE		
LIGHT ON POWER POLE		
LIGHT ON JOINT POLE		
POLE STATUS: REMOVE, LEAVE, PROPOSED, OR TEMPORARY AS APPLICABLE e.g.:		
RAILROAD		
RAILROAD SIGN		
RAILROAD SIGNAL		
UTILITY JUNCTION BOX		
OVERHEAD WIRE		
UNDERGROUND UTILITIES		
WATER (on existing lines label size, type and note if abandoned)		
SEWER		
TELEPHONE		
ELECTRIC		
GAS		
LIGHTING		
INTELLIGENT TRANSPORTATION SYSTEM		
FIBER OPTIC		
WATER SHUT OFF		
GAS SHUT OFF		
HYDRANT		
MANHOLES		
SEWER		
TELEPHONE		
ELECTRICAL		
GAS		
UNKNOWN		

TRAFFIC SIGNALS / ITS

	existing	PROPOSED
MAST ARM (existing)		
OPTICOM RECEIVER		
OPTICOM STROBE		
TRAFFIC SIGNAL		
PEDESTAL WITH PEDESTRIAN SIGNAL HEADS AND PUSH BUTTON UNIT		
SIGNAL CONDUIT		
CONTROLLER CABINET		
METER PEDESTAL		
PULL BOX		
LOOP DETECTOR (QUADRUPOLE)		
LOOP DETECTOR (RECTANGULAR)		
CAMERA POLE (CCTV)		
FIBER OPTIC DELINEATOR		
FIBER OPTIC SPLICE VAULT		
ITS EQUIPMENT CABINET		
VARIABLE SPEED LIMIT SIGN		
DYNAMIC MESSAGE SIGN		
ROAD AND WEATHER INFO SYSTEM		

CONSTRUCTION NOTES

CURB MARK NUMBER - BITUMINOUS	B-1
CURB MARK NUMBER - GRANITE	G-1
CLEARING AND GRUBBING AREA	
DRAINAGE NOTE	
EROSION CONTROL NOTE	
FENCING NOTE	
GUARDRAIL NOTE	
ITS NOTE	
LIGHTING NOTE	
TRAFFIC SIGNAL NOTE	

STATE OF NEW HAMPSHIRE			
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN			
<div style="text-align: center;"> <i>STANDARD SYMBOLS</i> </div>			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
41915SSI	41915	3	6

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
9-1-2016	41915SSI	41915	3	6

EROSION CONTROL STRATEGIES

1. ENVIRONMENTAL COMMITMENTS:

1.1. THESE GUIDELINES DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH ANY CONTRACT PROVISIONS, OR APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.

1.2. THIS PROJECT WILL BE SUBJECT TO THE US EPA'S NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORM WATER CONSTRUCTION GENERAL PERMIT AS ADMINISTERED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA). THIS PROJECT IS SUBJECT TO REQUIREMENTS IN THE MOST RECENT CONSTRUCTION GENERAL PERMIT (CGP).

1.3. THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE NHDES WETLAND PERMIT, THE US ARMY CORPS OF ENGINEERS PERMIT, WATER QUALITY CERTIFICATION AND THE SPECIAL ATTENTION ITEMS INCLUDED IN THE CONTRACT DOCUMENTS.

1.4. ALL STORM WATER, EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE NEW HAMPSHIRE STORMWATER MANUAL, VOLUME 3, EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION (DECEMBER 2008) (BMP MANUAL) AVAILABLE FROM THE NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES (NHDES).

1.5. THE CONTRACTOR SHALL COMPLY WITH RSA 485-A:17, AND ALL, PUBLISHED NHDES ALTERATION OF TERRAIN ENV-WQ 1500 REQUIREMENTS (HTTP://DES.NH.GOV/ORGANIZATION/COMMISSIONER/LEGAL/RULES/INDEX.HTM)

1.6. THE CONTRACTOR IS DIRECTED TO REVIEW AND COMPLY WITH SECTION 107.1 OF THE CONTRACT AS IT REFERS TO SPILLAGE, AND ALSO WITH REGARDS TO EROSION, POLLUTION, AND TURBIDITY PRECAUTIONS.
2. STANDARD EROSION CONTROL SEQUENCING APPLICABLE TO ALL CONSTRUCTION PROJECTS:

2.1. PERIMETER CONTROLS SHALL BE INSTALLED PRIOR TO EARTH DISTURBING ACTIVITIES. PERIMETER CONTROLS AND STABILIZED CONSTRUCTION EXITS SHALL BE INSTALLED AS SHOWN IN THE BMP MANUAL AND AS DIRECTED BY THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PREPARER.

2.2. EROSION, SEDIMENTATION CONTROL MEASURES AND INFILTRATION BASINS SHALL BE CLEANED, REPLACED AND AUGMENTED AS NECESSARY TO PREVENT SEDIMENTATION BEYOND PROJECT LIMITS THROUGHOUT THE PROJECT DURATION.

2.3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED IN ACCORDANCE WITH THE CONSTRUCTION GENERAL PERMIT AND SECTION 645 OF THE NHDOT SPECIFICATIONS FOR ROAD AND BRIDGES CONSTRUCTION.

2.4. AN AREA SHALL BE CONSIDERED STABLE IF ONE OF THE FOLLOWING HAS OCCURRED:

(A) BASE COURSE GRAVELS HAVE BEEN INSTALLED IN AREAS TO BE PAVED;

(B) A MINIMUM OF 85% VEGETATED GROWTH HAS BEEN ESTABLISHED;

(C) A MINIMUM OF 3" OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIP-RAP HAS BEEN INSTALLED;

(D) TEMPORARY SLOPE STABILIZATION CONFORMING TO TABLE 1 HAS BEEN PROPERLY INSTALLED

2.5. ALL STOCKPILES SHALL BE CONTAINED WITH A PERIMETER CONTROL. IF THE STOCKPILE IS TO REMAIN UNDISTURBED FOR MORE THAN 14 DAYS, MULCHING WILL BE REQUIRED.

2.6. A WATER TRUCK SHALL BE AVAILABLE TO CONTROL EXCESSIVE DUST AT THE DIRECTION OF THE CONTRACT ADMINISTRATOR.

2.7. TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL REMAIN UNTIL THE AREA HAS BEEN PERMANENTLY STABILIZED.

2.8. CONSTRUCTION PERFORMED ANY TIME BETWEEN NOVEMBER 30th AND MAY 1st OF ANY YEAR SHALL BE CONSIDERED WINTER CONSTRUCTION AND SHALL CONFORM TO THE FOLLOWING REQUIREMENTS.

(A) ALL PROPOSED VEGETATED AREAS WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15th, OR WHICH ARE DISTURBED AFTER OCTOBER 15th, SHALL BE STABILIZED IN ACCORDANCE WITH TABLE 1.

(B) ALL DITCHES OR SWALES WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15th, OR WHICH ARE DISTURBED AFTER OCTOBER 15th, SHALL BE STABILIZED TEMPORARILY WITH STONE OR IN ACCORDANCE WITH TABLE 1.

(C) AFTER NOVEMBER 30th INCOMPLETE ROAD SURFACES, WHERE WORK HAS STOPPED FOR THE SEASON, SHALL BE PROTECTED IN ACCORDANCE WITH TABLE 1.

(D) WINTER EXCAVATION AND EARTHWORK SHALL BE DONE SUCH THAT NO MORE THAN 1 ACRE OF THE PROJECT IS WITHOUT STABILIZATION AT ONE TIME, UNLESS A WINTER CONSTRUCTION PLAN HAS BEEN APPROVED BY NHDOT THAT MEETS THE REQUIREMENTS OF ENV-WQ 1505.02 AND ENV-WQ 1505.05.

(E) A SWPPP AMENDMENT SHALL BE SUBMITTED TO THE DEPARTMENT, FOR APPROVAL, ADDRESSING COLD WEATHER STABILIZATION (ENV-WQ 1505.05) AND INCLUDING THE REQUIREMENTS OF NO LESS THAN 30 DAYS PRIOR TO THE COMMENCEMENT OF WORK SCHEDULED AFTER NOVEMBER 30th.
3. PLAN ACTIVITIES TO ACCOUNT FOR SENSITIVE SITE CONDITIONS:

3.1. CLEARLY FLAG AREAS TO BE PROTECTED IN THE FIELD AND PROVIDE CONSTRUCTION BARRIERS TO PREVENT TRAFFICKING OUTSIDE OF WORK AREAS.

3.2. CONSTRUCTION SHALL BE SEQUENCED TO LIMIT THE DURATION AND AREA OF EXPOSED SOILS.

3.3. PROTECT AND MAXIMIZE EXISTING NATIVE VEGETATION AND NATURAL FOREST BUFFERS BETWEEN CONSTRUCTION ACTIVITY AND SENSITIVE AREAS.

3.4. WHEN WORK IS PERFORMED IN AND NEAR WATER COURSES, STREAM FLOW DIVERSION METHODS SHALL BE IMPLEMENTED PRIOR TO ANY EXCAVATION OR FILLING.

3.5. WHEN WORK IS PERFORMED WITHIN 50 FEET OF SURFACE WATERS (WETLAND, OPEN WATER OR FLOWING WATER), PERIMETER CONTROL SHALL BE ENHANCED CONSISTENT WITH SECTION 2.1.2.1. OF THE 2012 NPDES CONSTRUCTION GENERAL PERMIT.
4. MINIMIZE THE AMOUNT OF EXPOSED SOIL:

4.1. CONSTRUCTION SHALL BE SEQUENCED TO LIMIT THE DURATION AND AREA OF EXPOSED SOILS. MINIMIZE THE AREA OF EXPOSED SOIL AT ANY ONE TIME. PHASING SHALL BE USED TO REDUCE THE AMOUNT AND DURATION OF SOIL EXPOSED TO THE ELEMENTS AND VEHICLE TRACKING.

4.2. UTILIZE TEMPORARY MULCHING OR PROVIDE ALTERNATE TEMPORARY STABILIZATION ON EXPOSED SOILS IN ACCORDANCE WITH TABLE 1.

4.3. THE MAXIMUM AMOUNT OF DISTURBED EARTH SHALL NOT EXCEED A TOTAL OF 5 ACRES FROM MAY 1st THROUGH NOVEMBER 30th, OR EXCEED ONE ACRE DURING WINTER MONTHS, UNLESS THE CONTRACTOR DEMONSTRATES TO THE DEPARTMENT THAT THE ADDITIONAL AREA OF DISTURBANCE IS NECESSARY TO MEET THE CONTRACTORS CRITICAL PATH METHOD SCHEDULE (CPM), AND THE CONTRACTOR HAS ADEQUATE RESOURCES AVAILABLE TO ENSURE THAT ENVIRONMENTAL COMMITMENTS WILL BE MET.
5. CONTROL STORMWATER FLOWING ONTO AND THROUGH THE PROJECT:

5.1. DIVERT OFF SITE RUNOFF OR CLEAN WATER AWAY FROM THE CONSTRUCTION ACTIVITY TO REDUCE THE VOLUME THAT NEEDS TO BE TREATED ON SITE.

5.2. DIVERT STORM RUNOFF FROM UPSLOPE DRAINAGE AREAS AWAY FROM DISTURBED AREAS, SLOPES, AND AROUND ACTIVE WORK AREAS AND TO A STABILIZED OUTLET LOCATION.

5.3. CONSTRUCT IMPERMEABLE BARRIERS AS NECESSARY TO COLLECT OR DIVERT CONCENTRATED FLOWS FROM WORK OR DISTURBED AREAS.

5.4. STABILIZE, TO APPROPRIATE ANTICIPATED VELOCITIES, CONVEYANCE CHANNELS OR PUMPING SYSTEMS NEEDED TO CONVEY CONSTRUCTION STORMWATER TO BASINS AND DISCHARGE LOCATIONS PRIOR TO USE.

5.5. DIVERT OFF-SITE WATER THROUGH THE PROJECT IN AN APPROPRIATE MANNER SO NOT TO DISTURB THE UPSTREAM OR DOWNSTREAM SOILS, VEGETATION OR HYDROLOGY BEYOND THE PERMITTED AREA.
6. PROTECT SLOPES:

6.1. INTERCEPT AND DIVERT STORM RUNOFF FROM UPSLOPE DRAINAGE AREAS AWAY FROM UNPROTECTED AND NEWLY ESTABLISHED AREAS AND SLOPES TO A STABILIZED OUTLET OR CONVEYANCE.

6.2. CONSIDER HOW GROUNDWATER SEEPAGE ON CUT SLOPES MAY IMPACT SLOPE STABILITY AND INCORPORATE APPROPRIATE MEASURES TO MINIMIZE EROSION.

6.3. CONVEY STORMWATER DOWN THE SLOPE IN A STABILIZED CHANNEL OR SLOPE DRAIN.

6.4. THE OUTER FACE OF THE FILL SLOPE SHOULD BE IN A LOOSE RUFFLED CONDITION PRIOR TO TURF ESTABLISHMENT. TOPSOIL OR HUMUS LAYERS SHALL BE TRACKED UP AND DOWN THE SLOPE, DISKED, HARROWED, DRAGGED WITH A CHAIN OR MAT, MACHINE-RAKED, OR HAND-WORKED TO PRODUCE A RUFFLED SURFACE.
7. ESTABLISH STABILIZED CONSTRUCTION EXITS:

7.1. INSTALL AND MAINTAIN CONSTRUCTION EXITS, ANYWHERE TRAFFIC LEAVES A CONSTRUCTION SITE ONTO A PUBLIC RIGHT-OF-WAY.

7.2. SWEEP ALL CONSTRUCTION RELATED DEBRIS AND SOIL FROM THE ADJACENT PAVED ROADWAYS AS NECESSARY.
8. PROTECT STORM DRAIN INLETS:

8.1. DIVERT SEDIMENT LADEN WATER AWAY FROM INLET STRUCTURES TO THE EXTENT POSSIBLE.

8.2. INSTALL SEDIMENT BARRIERS AND SEDIMENT TRAPS AT INLETS TO PREVENT SEDIMENT FROM ENTERING THE DRAINAGE SYSTEM.

8.3. CLEAN CATCH BASINS, DRAINAGE PIPES, AND CULVERTS IF SIGNIFICANT SEDIMENT IS DEPOSITED.

8.4. DROP INLET SEDIMENT BARRIERS SHOULD NEVER BE USED AS THE PRIMARY MEANS OF SEDIMENT CONTROL AND SHOULD ONLY BE USED TO PROVIDE AN ADDITIONAL LEVEL OF PROTECTION TO STRUCTURES AND DOWN-GRADIENT SENSITIVE RECEPTORS.
9. SOIL STABILIZATION:

9.1. WITHIN THREE DAYS OF THE LAST ACTIVITY IN AN AREA, ALL EXPOSED SOIL AREAS, WHERE CONSTRUCTION ACTIVITIES ARE COMPLETE, SHALL BE STABILIZED.

9.2. IN ALL AREAS, TEMPORARY SOIL STABILIZATION MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE STABILIZATION REQUIREMENTS (SECTION 2.2) OF THE 2012 CGP. (SEE TABLE 1 FOR GUIDANCE ON THE SELECTION OF TEMPORARY SOIL STABILIZATION MEASURES.)

9.3. EROSION CONTROL SEED MIX SHALL BE SOWN IN ALL INACTIVE CONSTRUCTION AREAS THAT WILL NOT BE PERMANENTLY SEEDED WITHIN TWO WEEKS OF DISTURBANCE AND PRIOR TO SEPTEMBER 15, OF ANY GIVEN YEAR, IN ORDER TO ACHIEVE VEGETATIVE STABILIZATION PRIOR TO THE END OF THE GROWING SEASON.

9.4. SOIL TACKIFIERS MAY BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND REAPPLIED AS NECESSARY TO MINIMIZE SOIL AND MULCH LOSS UNTIL PERMANENT VEGETATION IS ESTABLISHED.
10. RETAIN SEDIMENT ON-SITE AND CONTROL DEWATERING PRACTICES:

10.1. TEMPORARY SEDIMENT BASINS (CGP-SECTION 2.1.3.2) OR SEDIMENT TRAPS (ENV-WQ 1506.10) SHALL BE SIZED TO RETAIN, ON SITE, THE VOLUME OF A 2-YEAR 24-HOUR STORM EVENT FOR ANY AREA OF DISTURBANCE OR 3,600 CUBIC FEET OF STORMWATER RUNOFF PER ACRE OF DISTURBANCE, WHICHEVER IS GREATER. TEMPORARY SEDIMENT BASINS USED TO TREAT STORMWATER RUNOFF FROM AREAS GREATER THAN 5-ACRES OF DISTURBANCE SHALL BE SIZED TO ALSO CONTROL STORMWATER RUNOFF FROM A 10-YEAR 24 HOUR STORM EVENT. ON-SITE RETENTION OF THE 10-YEAR 24-HOUR EVENT IS NOT REQUIRED.

10.2. CONSTRUCT AND STABILIZE DEWATERING INFILTRATION BASINS PRIOR TO ANY EXCAVATION THAT MAY REQUIRE DEWATERING.

10.3. TEMPORARY SEDIMENT BASINS OR TRAPS SHALL BE PLACED AND STABILIZED AT LOCATIONS WHERE CONCENTRATED FLOW (CHANNELS AND PIPES) DISCHARGE TO THE SURROUNDING ENVIRONMENT FROM AREAS OF UNSTABILIZED EARTH DISTURBING ACTIVITIES.

11. ADDITIONAL EROSION AND SEDIMENT CONTROL GENERAL PRACTICES:

11.1. USE TEMPORARY MULCHING, PERMANENT MULCHING, TEMPORARY VEGETATIVE COVER, AND PERMANENT VEGETATIVE COVER TO REDUCE THE NEED FOR DUST CONTROL. USE MECHANICAL SWEEPERS ON PAVED SURFACES WHERE NECESSARY TO PREVENT DUST BUILDUP. APPLY WATER, OR OTHER DUST INHIBITING AGENTS OR TACKIFIERS, AS APPROVED BY THE NHDES.

11.2. ALL STOCKPILES SHALL BE CONTAINED WITH TEMPORARY PERIMETER CONTROLS. INACTIVE SOIL STOCKPILES SHOULD BE PROTECTED WITH SOIL STABILIZATION MEASURES (TEMPORARY EROSION CONTROL SEED MIX AND MULCH, SOIL BINDER) OR COVERED WITH ANCHORED TARPS.

11.3. EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSPECTED IN ACCORDANCE WITH SECTION 645 OF NHDOT SPECIFICATIONS, WEEKLY AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.25 IN. OF RAIN PER 24-HOUR PERIOD. EROSION AND SEDIMENT CONTROL MEASURES WILL ALSO BE INSPECTED IN ACCORDANCE WITH THE GUIDANCE MEMO FROM THE NHDES CONTAINED WITHIN THE CONTRACT PROPOSAL AND THE EPA CONSTRUCTION GENERAL PERMIT.

11.4. THE CONTRACTOR SHOULD UTILIZE STORM DRAIN INLET PROTECTION TO PREVENT SEDIMENT FROM ENTERING A STORM DRAINAGE SYSTEM PRIOR TO THE PERMANENT STABILIZATION OF THE CONTRIBUTING DISTURBED AREA.

11.5. PERMANENT STABILIZATION MEASURES WILL BE CONSTRUCTED AND MAINTAINED IN LOCATIONS AS SHOWN ON THE CONSTRUCTION PLANS TO STABILIZE AREAS. VEGETATIVE STABILIZATION SHALL NOT BE CONSIDERED PERMANENTLY STABILIZED UNTIL VEGETATIVE GROWTH COVERS AT LEAST 85% OF THE DISTURBED AREA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR EROSION AND SEDIMENT CONTROL FOR ONE YEAR AFTER PROJECT COMPLETION.

11.6. CATCH BASINS: CARE SHALL BE TAKEN TO ENSURE THAT SEDIMENTS DO NOT ENTER ANY EXISTING CATCH BASINS DURING CONSTRUCTION. THE CONTRACTOR SHALL PLACE TEMPORARY STONE INLET PROTECTION OVER INLETS IN AREAS OF SOIL DISTURBANCE THAT ARE SUBJECT TO SEDIMENT CONTAMINATION.

11.7. TEMPORARY AND PERMANENT DITCHES SHALL BE CONSTRUCTED, STABILIZED AND MAINTAINED IN A MANNER THAT WILL MINIMIZE SCOUR. TEMPORARY AND PERMANENT DITCHES SHALL BE DIRECTED TO DRAIN TO SEDIMENT BASINS OR STORM WATER COLLECTION AREAS.

11.8. WINTER EXCAVATION AND EARTHWORK ACTIVITIES NEED TO BE LIMITED IN EXTENT AND DURATION, TO MINIMIZE POTENTIAL EROSION AND SEDIMENTATION IMPACTS. THE AREA OF EXPOSED SOIL SHALL BE LIMITED TO ONE ACRE, OR THAT WHICH CAN BE STABILIZED AT THE END OF EACH DAY UNLESS A WINTER CONSTRUCTION PLAN, DEVELOPED BY A QUALIFIED ENGINEER OR A CPESC SPECIALIST, IS REVIEWED AND APPROVED BY THE DEPARTMENT.

11.9. CHANNEL PROTECTION MEASURES SHALL BE SUPPLEMENTED WITH PERIMETER CONTROL MEASURES WHEN THE DITCH LINES OCCUR AT THE BOTTOM OF LONG FILL SLOPES. THE PERIMETER CONTROLS SHALL BE INSTALLED ON THE FILL SLOPE TO MINIMIZE THE POTENTIAL FOR FILL SLOPE SEDIMENT DEPOSITS IN THE DITCH LINE.

BEST MANAGEMENT PRACTICES (BMP) BASED ON AMOUNT OF OPEN CONSTRUCTION AREA

12. STRATEGIES SPECIFIC TO OPEN AREAS LESS THAN 5 ACRES:

12.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500; ALTERATION OF TERRAIN FOR CONSTRUCTION AND USE ALL CONVENTIONAL BMP STRATEGIES.

12.2. SLOPES STEEPER THAN 3:1 WILL RECEIVE TURF ESTABLISHMENT WITH MATTING.

12.3. SLOPES 3:1 OR FLATTER WILL RECEIVE TURF ESTABLISHMENT ALONE.

12.4. AREAS WHERE HAUL ROADS ARE CONSTRUCTED AND STORMWATER CANNOT BE TREATED THE DEPARTMENT WILL CONSIDER INFILTRATION.

12.5. FOR HAUL ROADS ADJACENT TO SENSITIVE ENVIRONMENTAL AREAS OR STEEPER THAN 5%, THE DEPARTMENT WILL CONSIDER USING EROSION STONE, CRUSHED GRAVEL, OR CRUSHED STONE BASE TO HELP MINIMIZE EROSION ISSUES.

12.6. ALL AREAS THAT CAN BE STABILIZED SHALL BE STABILIZED PRIOR TO OPENING UP NEW TERRITORY.

12.7. DETENTION BASINS SHALL BE DESIGNED AND CONSTRUCTED TO ACCOMMODATE A 2 YEAR STORM EVENT.
13. STRATEGIES SPECIFIC TO OPEN AREAS BETWEEN 5 AND 10 ACRES:

13.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500 ALTERATION OF TERRAIN AND SHALL USE CONVENTIONAL BMP STRATEGIES AND ALL TREATMENT OPTIONS USED FOR UNDER 5 ACRES WILL BE UTILIZED.

13.2. DETENTION BASINS WILL BE CONSTRUCTED TO ACCOMMODATE THE 2-YEAR 24-HOUR STORM EVENT AND CONTROL A 10-YEAR 24-HOUR STORM EVENT.

13.3. SLOPES STEEPER THAN A 3:1 WILL RECEIVE TURF ESTABLISHMENT WITH MATTING OR OTHER TEMPORARY SOIL STABILIZATION MEASURES DETAILED IN TABLE 1. THE CONTRACTOR MAY ALSO CONSIDER A SOIL BINDER IN ACCORDANCE WITH THE NHDES APPROVALS OR REGULATIONS. OTHER ALTERNATIVE MEASURES, SUCH AS BONDED FIBER MATRIXES (BFMS) OR FLEXIBLE GROWTH MEDIUMS (FGMS) MAY BE UTILIZED, IF MEETING THE NHDES APPROVALS AND REGULATIONS.

13.4. SLOPES 3:1 OR FLATTER WILL RECEIVE TURF ESTABLISHMENT OR OTHER TEMPORARY SOIL STABILIZATION MEASURES DETAILED IN TABLE 1. THE CONTRACTOR MAY ALSO CONSIDER A SOIL BINDER IN ACCORDANCE WITH THE NHDES APPROVALS OR REGULATIONS.
14. STRATEGIES SPECIFIC TO OPEN AREAS OVER 10 ACRES:

14.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500 ALTERATION OF TERRAIN AND SHALL USE CONVENTIONAL BMP STRATEGIES AND ALL TREATMENT OPTIONS USED FOR UNDER 5 ACRES AND BETWEEN 5 AND 10 ACRES WILL BE UTILIZED.

14.2. THE DEPARTMENT ANTICIPATES THAT SOIL BINDERS WILL BE NEEDED ON ALL SLOPES STEEPER THAN 3:1, IN ORDER TO MINIMIZE EROSION AND REDUCE THE AMOUNT OF SEDIMENT IN THE STORMWATER TREATMENT BASINS.

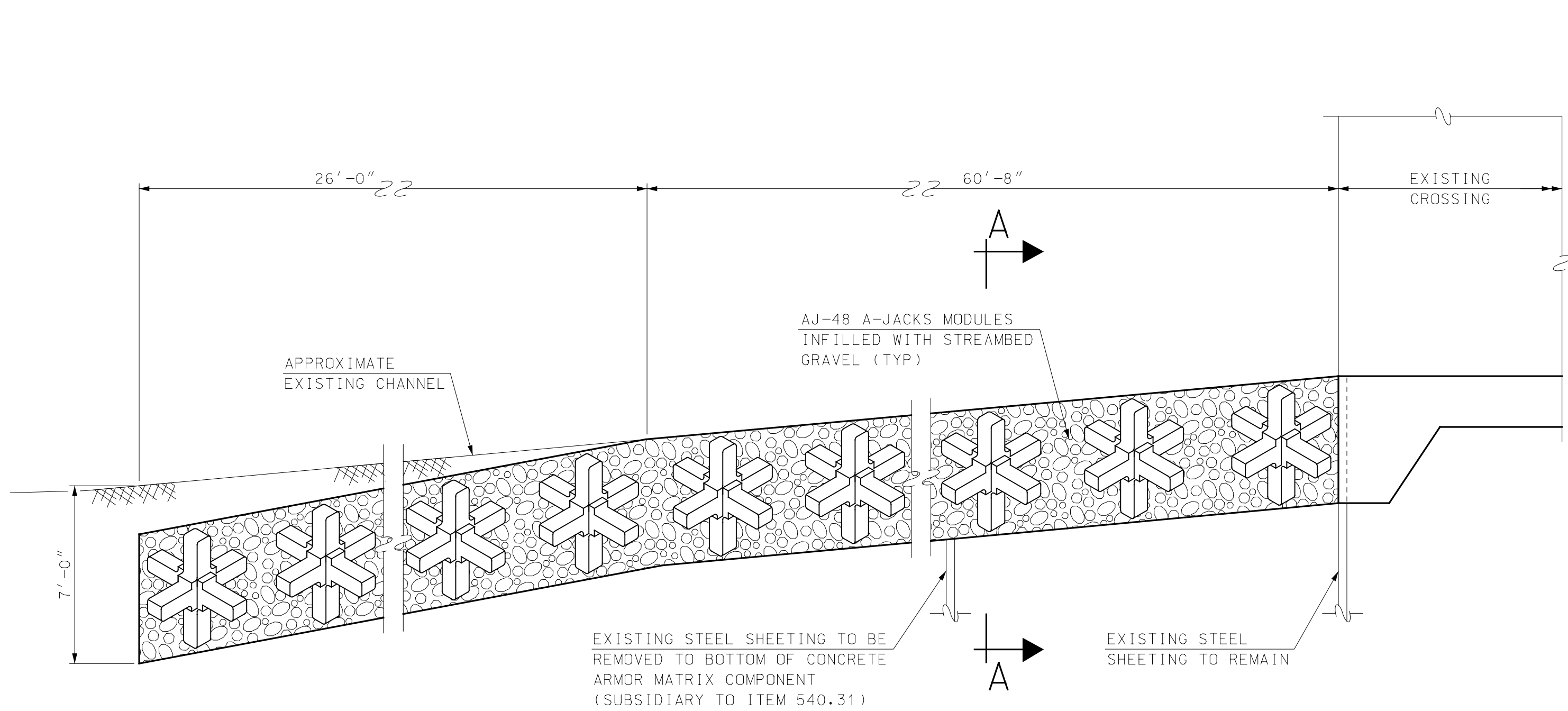
14.3. THE CONTRACTOR WILL BE REQUIRED TO HAVE AN APPROVED DESIGN IN ACCORDANCE WITH ENV-WQ 1506.12 FOR AN ACTIVE FLOCCULANT TREATMENT SYSTEM TO TREAT AND RELEASE WATER CAPTURED IN STORM WATER BASINS. THE CONTRACTOR SHALL ALSO RETAIN THE SERVICES OF AN ENVIRONMENTAL CONSULTANT WHO HAS DEMONSTRATED EXPERIENCE IN THE DESIGN OF FLOCCULANT TREATMENT SYSTEMS. THE CONSULTANT WILL ALSO BE RESPONSIBLE FOR THE IMPLEMENTATION AND MONITORING OF THE SYSTEM.

TABLE 1
GUIDANCE ON SELECTING TEMPORARY SOIL STABILIZATION MEASURES

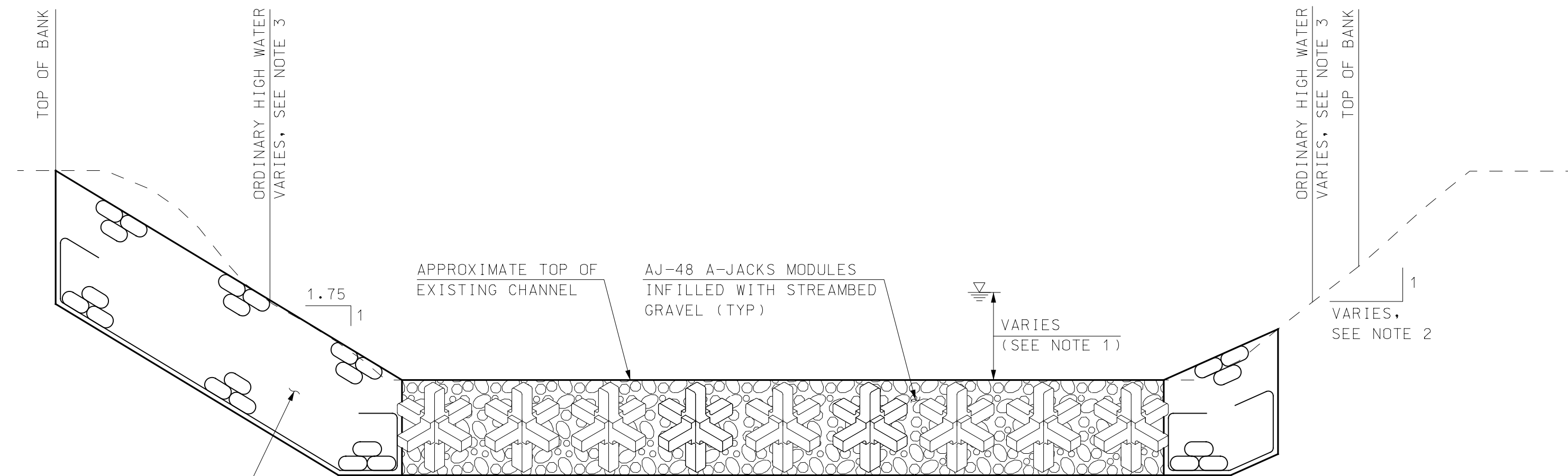
APPLICATION AREAS	DRY MULCH METHODS				HYDRAULICALLY APPLIED MULCHES ²				ROLLED EROSION CONTROL BLANKETS ³			
	HMT	WC	SG	CB	HM	SMM	BFM	FRM	SNSB	DNSB	DNSCB	DNCB
SLOPES ¹												
STEEPER THAN 2:1	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES
2:1 SLOPE	YES ¹	YES ¹	YES	YES	NO	NO	YES	YES	NO	YES	YES	YES
3:1 SLOPE	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NO
4:1 SLOPE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO
WINTER STABILIZATION	4T/AC	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES
CHANNELS												
LOW FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
HIGH FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES

ABBREV.	STABILIZATION MEASURE	ABBREV.	STABILIZATION MEASURE	ABBREV.	STABILIZATION MEASURE
HMT	HAY MULCH & TACK	HM	HYDRAULIC MULCH	SNSB	SINGLE NET STRAW BLANKET
WC	WOOD CHIPS	SMM	STABILIZED MULCH MATRIX	DNSB	DOUBLE NET STRAW BLANKET
SG	STUMP GRINDINGS	BFM	BONDED FIBER MATRIX	DNSCB	2 NET STRAW-COCONUT BLANKET
CB	COMPOST BLANKET	FRM	FIBER REINFORCED MEDIUM	DNCB	2 NET COCONUT BLANKET

- NOTES:
1. ALL SLOPE STABILIZATION OPTIONS ASSUME A SLOPE LENGTH ≤10 TIMES THE HORIZONTAL DISTANCE COMPONENT OF THE SLOPE, IN FEET.
2. PRODUCTS CONTAINING POLYACRYLAMIDE (PAM) SHALL NOT BE APPLIED DIRECTLY TO OR WITHIN 100 FEET OF ANY SURFACE WATER WITHOUT PRIOR WRITTEN APPROVAL FROM THE NH DEPARTMENT OF ENVIRONMENTAL SERVICES.
3. ALL EROSION CONTROL BLANKETS SHALL BE MADE WITH WILDLIFE FRIENDLY BIODEGRADABLE NETTING.



CHANNEL LONGITUDINAL SECTION
NOT TO SCALE

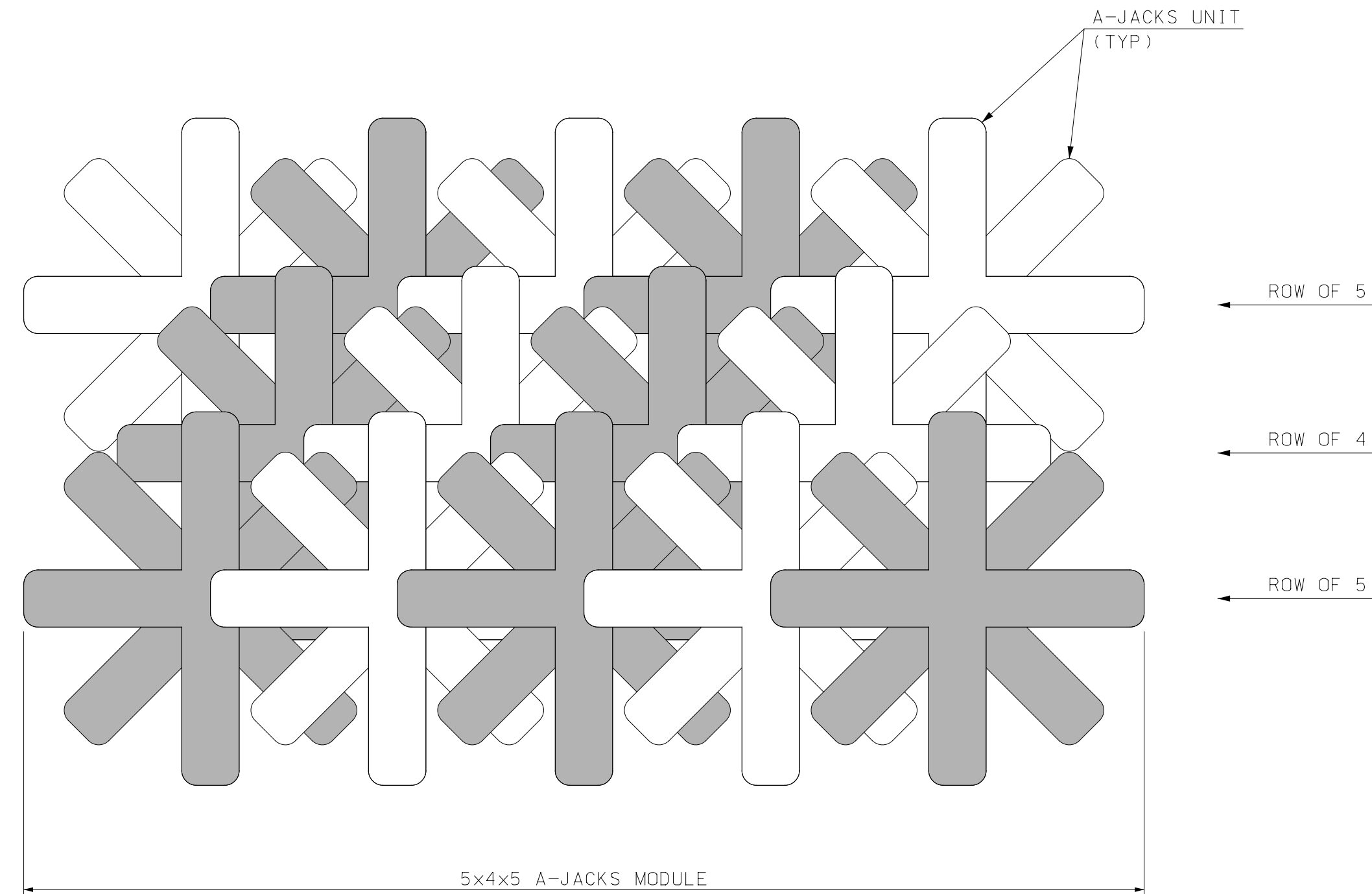


ITEM 583.9, RIPRAP, CLASS IX (6'-0" THICK) WITH ITEM 593.411, GEOTEXTILE: PERM CONTROL CL.1, NON-WOVEN (TYP)

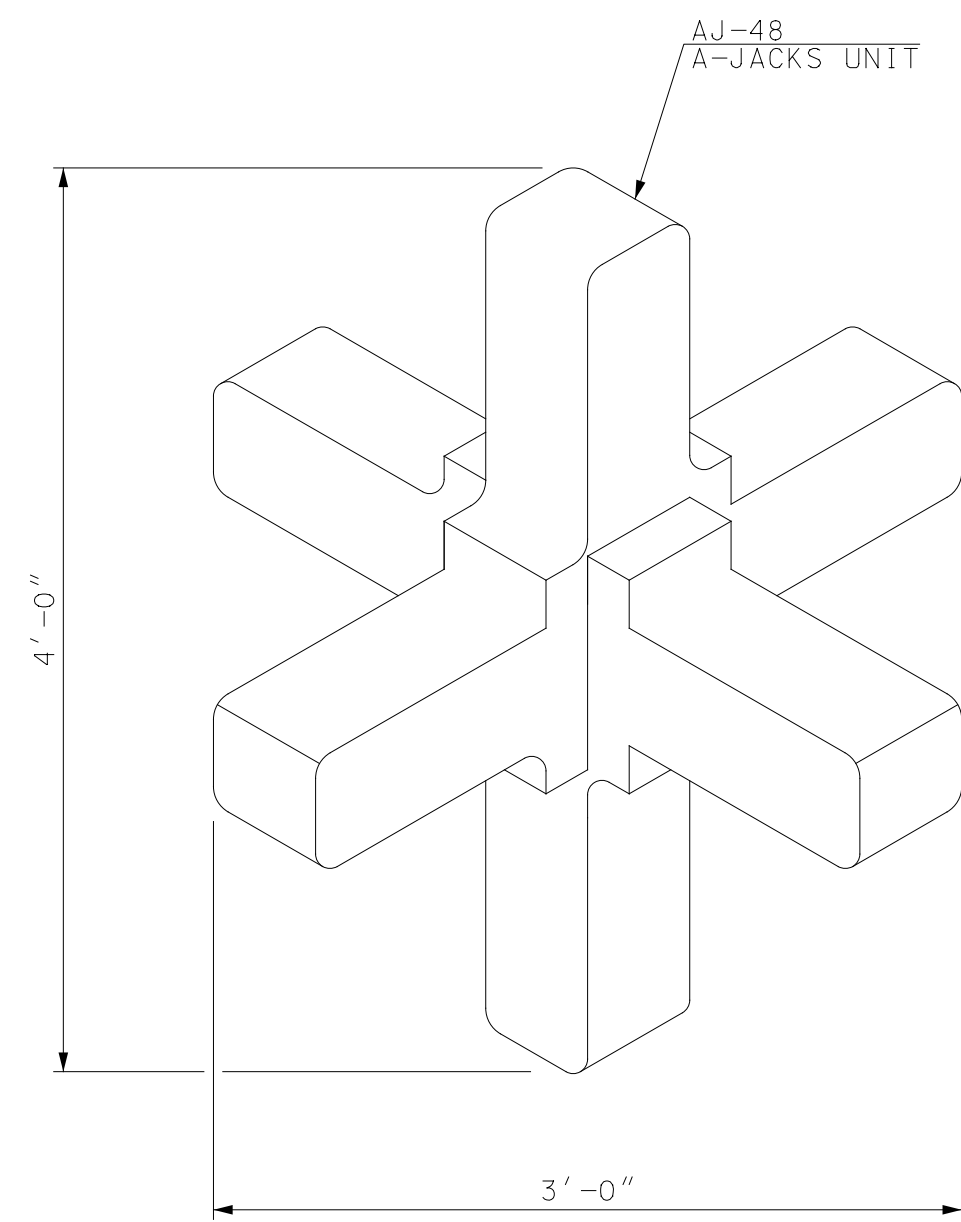
- NOTE
1. APPROXIMATE 2-YEAR STORM EVENT WATER DEPTH:
 - 7.3' UPSTREAM
 - 3.0' DOWNSTREAM
 2. SLOPE:
 - 0.75:1 MINIMUM
 - 3:1 MAXIMUM
 3. ORDINARY HIGH WATER ELEVATION:
 - 636' MINIMUM
 - 644' MAXIMUM
 4. BANK IMPACT ELEVATIONS:
 - 636' MINIMUM
 - 653' MAXIMUM

SECTION A-A
SCALE: $\frac{3}{16}" = 1'-0"$

RIPRAP PARAMETERS								
RIPRAP CLASS AND SIZES			PERCENTAGE DISTRIBUTION OF PARTICLE SIZES BY VOLUME (CUBIC FT)				ALLOWABLE PARTICLE SIZE	
CLASS	NOMINAL SIZE (IN)	MAXIMUM SIZE (IN)	< 15%	15% - 85%	> 85%	MAXIMUM	MINIMUM	MAXIMUM
IX	36	72	10	27	65	179	22.0	72.0



5x4x5 A-JACKS MODULE (AJ-48)
NOT TO SCALE



A-JACKS UNIT (AJ-48)
NOT TO SCALE

Hoyle, Tanner & Associates, Inc.

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
XX	41915Dets	AS SHOWN

STATE OF NEW HAMPSHIRE											
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN											
TOWN	WOODSTOCK		BRIDGE NO.		203/079		STATE PROJECT		41915		
LOCATION										L-93 SOUTHBOUND OVER EASTMAN BROOK	
WOODSTOCK SCOUR TREATMENT DETAILS									BRIDGE SHEET		
REVISIONS AFTER PROPOSAL					BY	DATE			BY	DATE	OF
			DESIGNED	JAD/KMH	02/19	CHECKED	STJ	02/19			
			DRAWN	TAG	07/20	CHECKED	EGW	07/20	FILE NUMBER		
			QUANTITIES	KMH	03/20	CHECKED	EGW	03/20			
			ISSUE DATE		FEDERAL PROJECT NO.		SHEET NO.		TOTAL SHEETS		
			REV. DATE		X-A004(779)		6		6		